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From the Editor

Abdulrazak Abyad
(Chief Editor)

This is the fourth issue of the journal this year with variable papers from all over the World.

We welcome the South Asia Region and the inaugural ***South Asia Journal of Family Medicin***e to our global readership.

A paper from Eden University evaluated the prevalence of non-alcoholic fatty liver and explored the relationship between fatty liver and the metabolic syndrome. A number of 140 adult Yemeni subjects were prospectively assessed. The prevalence of fatty liver in the study subjects was 35%. The authors concluded that there is a high prevalence of nonalcoholic fatty liver among certain populations in Yemen, to which obesity, diabetes, hypertension and hyperlipidemia are closely relevant.

A paper from the College of Medicine, King Faisal University and Maternity Hospital, Al-Ahsa, Saudi Arabia looked at the accuracy of IgG avidity measurement for the detection of acute Toxoplasmosis in the first 16 weeks of gestation. The study included 160 early pregnancy women. Sera were screened for anti-Toxoplasma IgG and IgM and for IgG-avidity test. The diagnostic accuracy of low avidity in relation to Ig G positivity revealed a significant negative likelihood ratio. The authors concluded that IgG avidity test is most useful if high-avidity antibodies are detected in IgM-positive women and also in IgM-negative women with low-avidity antibodies.

A prospective review of Cerebral Palsy cases seen in a child's neurology clinic in West Africa within five years from Nigeria looked at global epidemiology of cerebral palsy by describing its impact in this setting. The social and economic impact of Cerebral palsy is enormous in both the industrialized and developing settings. 341 cases met the specific inclusion criteria and were analysed. The authors stressed that this review could lead to further comprehension of the underlying aetiopathogenic factors which might lead to specific and generic preventive interventions in this and other similar settings

A paper from Egypt examined factors affecting the choice of maternal health services in Port Said City. A house-to-house survey of 225 women in Port Said City was carried out to determine the maternal factors associated with this choice. The analysis showed that socioeconomic status of the family, distance from the health service, occupation and education of the mother were the strongest determinants of the choice of maternal health service used respectively. The authors concluded that the availability and accessibility of these services, coupled with health education programs, could have contributed greatly to such a practice.

A paper from India reflects on the experience of research in general practice

It is a reflection of the author's experiences during his visit to Australia

.The author stressed that "An excellent healthcare system must be underpinned by excellent clinical research". The author states that research should be the lever that will elevate the status of the specialty in India attracting the best in the medical field and providing solutions to the health needs of the country that are effective, relevant and affordable.

A paper from Amman investigated the prevalance and evaluated the risk of Denture Stomatitis in acrylic denture wearers suffering from Type II Diabetes Mellitus, in comparison with patients with normal glucose metabolism. Patients with Type II Diabetes Mellitus had a significantly higher prevalence of Denture Stomatitis compared with non-diabetics. The authors concluded that Type II Diabetes Mellitus is a risk factor for Denture Stomatitis and could be a beneficial indicator for the early diagnosis of Diabetes.

A cross sectional survey was done among 1,786 currently married fecund women attending the immunization unit of the chosen primary health care centers in Iraq, were studied. The aim of the present study is to provide an estimate of the level of unmet need and determining predictors in Mosul City in the North of Iraq. The authors concluded that the reported high level of unmet need can be used as a baseline data for further follow-up research. Effective family planning programs, better services delivered to the families, provision of modern contraceptives and counseling are mandatory.

A paper from Jordan analyzed the outcome and incidence of meconium aspiration syndrome in post term delivery and the benefit of intrauterine amnioinfusion. 32 pregnant women were followed. Out of (8) patients who were managed with intrauterine amnioinfusion (6) patients 75% had normal umbilical pH>7.2, good Apgar score at 1 minute and at 5 minutes (8l10 and normal acid -base balance) and were immediately transferred to their mother. While out of (24) 12.5% had meconium aspiration syndrome (3) patients (umbilical pH <7.2) and needed aggressive suctioning at delivery. as well as low Apgar score at 1 minute and at 5 minutes. The authors concluded that Intrauterine amnioinfusion was proven in preventing meconium aspiration syndrome by dilution of amniotic fluid contents and reduced obstruction in the nasopharanyx area.

Immunoglobulin G Avidity in Diagnosis of Early Pregnancy Toxoplasmosis in Saudi Arabia

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ABSTRACT

Background: The diagnosis of acute toxoplasmosis depends on the presence of IgM, but it may persist for a long time in some cases disrupting this consideration.

Objective: to determine accuracy of IgG avidity measurement for the detection of acute Toxoplasmosis in the first 16 weeks of gestation.

Settings: This study was performed at the College of Medicine, King Faisal University and Maternity Hospital, Al-Ahsa, Saudi Arabia.

Patients and methods: The study included 160 early pregnancy women. Sera were screened for anti-Toxoplasma IgG and IgM and for IgG-avidity test. PCR was done for confirmation in the selected group of specimens.

Results: The diagnostic accuracy of low avidity in relation to Ig G positivity revealed a significant negative likelihood ratio. The low avidity in the presence of Ig M positive antibodies revealed positive likelihood ratio. The diagnostic accuracy of low Ig G avidity versus high Ig G avidity in comparison with positive DNA by PCR revealed a sensitivity of 91% and -ve PV of 84.2.

Conclusion: IgG avidity test is most useful if high-avidity antibodies are detected in IgM-positive women and also in IgM-negative women with low-avidity antibodies.

Key words: Toxoplasma gondii, congenital toxoplasmosis, IgG Avidity

Introduction

Approximately one third of the world's population is infected by the obligate intracellular protozoan Toxoplasma gondii. In contrary to the immunocompetent individuals, acute infection during pregnancy constitutes a great maternal challenge due to the risk of congenital toxoplasmosis (1,2). The precise prevalence of toxoplasmosis during pregnancy in many countries is not well known (3).

One of the studies done in Saudi Arabia by Al-Qurashi et al, 2001 found that the inactive toxoplasmosis during pregnancy was of rather high prevalence in the Eastern Region of Saudi Arabia (25%), while active toxoplasmosis was of low prevalence (5%)(4). The prevalence was reported by other Saudi studies to be 31.6% in Abha (5) and 35.6% in Makkah (6). Al-Harthi et al., 2006 reported a seroprevalence 29.4% in the holy city of Makkah (7).

The infection is acquired by ingestion of viable tissue cysts in raw or undercooked meat (incubation period ranges from 10 to 23 days). Also humans can inadvertently ingest oocysts excreted by cats that contaminate the environment (incubation period ranges from 5 to 20 days) (8). Transplacental toxoplasmosis results in fetal damage, which is more common if infection occurs in the latter half of pregnancy, but it is worse if infections were acquired in early pregnancy (9,10).

The clearance of Toxoplasma DNA from the blood after acute toxoplasmosis occurs from 5.5-13 weeks. PCR diagnosis is possible during this period. Conventional serum assays of anti toxoplasma immunoglobulins IgG and IgM help in the distinction between a recent and chronic infection. Sero-conversion is an evidence for recent infection (11). The presence of IgM may denote recent infection, but the tendency of IgM to persist for a long time in some cases or present in some cases of chronic infection disrupts this consideration (12,13).

The best use of IgM antibody is when it is absent; thus a woman with IgG but without IgM is extremely unlikely to have recently acquired toxoplasmosis (14). It has been postulated that IgG avidity test can provide confirmatory evidence of an acute infection and can distinguish reactivations from primary infections with a single serum specimen (15,16).

Subsequently the objective of the present study was to determine accuracy of IgG avidity measurement for detection of acute Toxoplasmosis in the first 16 weeks of gestation among a sample of pregnant women in Al Ahsa, KSA.

Materials and Methods

Setting and study design:
This study was performed at the College of Medicine, King Faisal University, and the Maternity Hospital, Al-Ahsa Province, Saudi Arabia in the period from January 2008 through April 2009. Women attending the outpatient clinics in Al-Ahsa Maternity hospital in the first 16 weeks of pregnancy were invited to participate in the study.

Data collection and Laboratory investigations:
The study included 160 women; 86 women with one or more of abnormal pregnancy outcomes as abortion and intrauterine fetal death (high-risk group) and 74 women without risk factors. All women were interviewed using a structured questionnaire. Demographic and gestational-related information were recorded for each woman who agreed to participate. Age in years, gestational age and number of children were recorded. Identified risk factors were inquired about, including residence, gravidity, number of previous abortions or intrauterine fetal deaths if any, frequency of consumption of undercooked meat, un-pasteurized milk, unfiltered municipal water, raw or non-washed vegetables or fruit, eating outside home and occasional contact with soil (8).

Toxoplasmosis assays:
Sera (N=160) from women were tested for anti-Toxoplasma IgG and IgM and for antibody IgG-avidity. The PCR was done for confirmation of Toxoplasma infection status in some cases as will be described later.

a) IgG/IgM ELISA
Anti-Toxoplasma IgG and IgM antibodies were determined by a commercially available enzyme-linked immunosorbent assay (ELISA) by the Enzywell Kits from Diesse Diagnostica Senese Italy supplied by United Diagnostics Industry Company in Saudi Arabia. The antibody levels are determined by reading the adsorbance (O.D.) at 450 nm. Calculate the ratio between the O.D. value of the sample and the Cut-off.

For IgG, the sample is considered: Positive: if the ratio is > 1.3.Doubtful: > 0.7 - < 1.3 Negative: if the ratio is < 0.7.

For IgM, the sample is considered: Positive: if the ratio is > 1.2. Doubtful: > 0.8 - < 1.2 Negative: if the ratio is < 0.8. If the result is doubtful, repeat the test. If it remains doubtful, collect a new serum sample.

b) IgG avidity assay
The test was done using Enzywell ELISA kits supplied by Diesse Diagnostica Senese Italy supplied by United Diagnostics Industry Company in Saudi Arabia. The antibody avidity is determined by reading the adsorbance (O.D.) at 450 nm. The percentage of avidity of the samples is expressed and calculated using the ratio between the OD found in the wells containing avidity buffer and those with Wash Buffer, subtracting the value of the test blank. A ratio over 35% indicates the presence of high avidity IgG antibodies; when it is lower than 30%, this indicates the presence of low avidity. If the percentage is between 30 and 35%, there is a borderline degree.

c) Nested-PCR.
The PCR assay was done for a selected group of specimens that required further confirmatory analyses. These included IgM-positive and IgG-negative women with high-avidity antibodies. Also it was done for cases of low-avidity antibodies with either positive IgG or negative IgM.

DNA was isolated from blood samples using a commercial purification system (Wizard Genomic DNA Purification Kit; Promega, Madison, WI) following the manufacturer's instructions. Final pellets were resuspended in 30 L of TE buffer (10 mM Tris, 1 mM EDTA, pH 7.2) and stored at -70°C until used. The nested-PCR amplifications were performed to amplify a fragment from the B1 genes described elsewhere (17). The PCR product was analysed on a 1% agarose gel stained with ethidium bromide. The TOXO lanes indicate the amounts of genomic DNA (17,18).

Data processing and analysis:
Data were analyzed using SPSS software version 13 (SPSS Inc. Chicago, Il). Data were analyzed using Chi-square and Fisher's exact tests. Univariate analysis was used and the results were expressed in Odds ratio and 95% confidence intervals. The accuracy of the IgG

Socio-demographics		High risk Cases (N = 86) No. (%)	Controls (N = 74) No. (%)	Odds ratio and 95% Confidence intervals
Age groups (No.)				
20	(58)	31 (36)	27 (36.5)	ref.
21-30	(80)	37 (43)	43 (58.1)	0.54(0.28-1.07)
31-40	(22)	18 (21)	4 (5.4)	4.63(1.41-19.62)**†
Gestational age in weeks:				
1-6 weeks		19 (22.1)	5 (6.8)	ref.
6-8 weeks		13 (15.1)	13 (17.6)	0.84(0.33-2.09)
8-13 weeks		32 (37.2)	41 (55.4)	0.48(0.42-0.94)*
13-16 weeks		22 (25.6)	15 (20.3)	1.35(0.60-3.05)
Residence:				
Urban		17 (19.8)	23 (31.1)	ref.
Rural		56 (65.1)	48 (64.9)	1.01(0.50-2.04)
Hegar		13 (15.1)	3 (4.1)	4.21(1.08-23.84)* †
Dealing with raw food:				
Seldom		11 (12.8)	26 (35.1)	ref.
Sometimes		21(24.4)	19 (25.7)	1.36(0.64-2.91)
Always		54 (62.8)	54 (39.2)	1.41(0.75-2.65)
Contact with animals:				
Seldom		26 (30.2)	21 (28.4)	ref.
Sometimes		28 (32.6)	28 (37.8)	0.7(0.39-1.60)
Always		32(37.2)	25 (33.8)	1.16(0.58-2.35)
Contact with soil:				
Seldom		23 (26.7)	21 (28.4)	ref.
Sometimes		27 (31.4)	26 (35.1)	0.75(0.36-1.55)
Always		36 (41.9)	27 (36.5)	1.28(0.64-2.55)

Table 1: Socio-demographic characteristics of the included women in relation to the risk of infection

avidity tests were reported through calculating sensitivity, specificity, predictive values and likelihood ratio. P value <0.05 was considered significant.

Ethical considerations: All women participating in this study gave their informed consent. Typically, infected pregnant patients with suspected active Toxoplasma infection were prescribed spiramycin throughout their pregnancy. The newborn were screened for active Toxoplasma infection by doing IgM testing on cord blood. (19)

Results

A total of 160 pregnant women in the first 16 weeks of gestation were included with age ranged from 18 to 39 years (mean 24.8 ± 3.19 years). The pregnancy duration ranged from 6 to 16 weeks, median of 10, and

	IgG antibody levels			IgM antibody levels			Total
	Positive (> 1.3)	Equivocal (0.7-1.3)	Negative (< 0.7)	Positive (> 1.2)	Equivocal (0.8-1.2)	Negative (< 0.8)	
No.	44	36	80	74	20	66	160
%	27.5	22.5	50	46.3	12.5	41.2	100

Table 2: Distribution of the IgG and IgM levels

IgG Avidity	Mean value ± SD	No	%
Low Avidity (< 30%)	(27.8±1.0)	94	58.8
Borderline Avidity (30-35%)	(32.8±0.9)	14	8.7
High Avidity (> 35%)	(39.3±2.4)	52	32.5
Total		160	100

Table 3: Distribution of the IgG avidity test findings

mean of 10.4 at the time of data and specimens collection. Out of the included women, 43/160 (27 %) were primigravida and 117 (73 %) were multigravida.

Table (1) demonstrates some demographics and potential risk factors distributed according to the pertinent risk of included women. Those of older age (age group > 30 years), and residing in Hegar, were significant risk factors for being classified as high risk for infection. While frequent consuming, and dealing with raw foods and contacting of soil and animals show higher Odds for infections, they were insignificant.

Table (2) demonstrated the distribution of the ELISA IgG / IgM levels. Out of the 160 specimens evaluated for Ig G anti-Toxoplasma antibodies, 50% showed negative results while 27.5% were positive. Regarding Ig M anti-Toxoplasma antibodies, 46.5% showed positive results while 41.2% were negative.

Table (3) described the IgG Avidity distribution. Low avidity (<30%) was prevalent in 58.8% of cases and high avidity was present in 32.5% of cases.

Table (4) demonstrates the comparative results of the ELISA IgG / IgM and IgG avidity test. Out of the 160 specimens evaluated by these tests, 44 were positive for Ig G anti-Toxoplasma antibodies, of which 16 specimens (36.4%) had low avidity. While, 74/160 of the samples were positive for Ig M anti-Toxoplasma antibodies, of which 57 specimens (77%) had low avidity.

The diagnostic accuracy of low avidity in relation to Ig G positivity revealed sensitivity of 36.4% (Confidence intervals, CI=22-52), specificity of 7.5% (CI=2-15), positive predictive value (+ve PV) of 17.8% (C.I=10-27), negative predictive value (-ve PV) of 17.7% (CI=6-34), with significant negative Likelihood ratio of 8.48 (CI= 3.81-18.9). The low avidity in the presence of Ig M positive antibodies revealed sensitivity of 77.0% (C.I= 65-86), specificity of 51.5% (C.I=38-64), with a +ve PV of 64.0%, -ve PV of 66.7% and +ve likelihood ratio of 1.58(C. I=1.2-2.09). In case of high avidity results in relation to the positivity of Ig G antibodies, we revealed a specificity of 95% (C.I=87-98), and a high +ve likelihood ratio of 9.54 (C.I= 3.49-26.06).

Table (5) displayed the results of PCR analysis performed on the 67 selected women. These included 32 IgM-negative women with low-avidity antibodies, 16 women with positive IgG levels with low-avidity antibodies, 15 IgG-negative and 4 IgM-positive women with high-avidity antibodies. PCR test was positive in 22 out of the 32 cases with negative IgM and low IgG avidity (68.8%). Also, it was positive in 7 out of the 16 cases of positive IgG and low IgG avidity (40%). PCR test was positive in only 3 out of the 15 cases of positive IgM and high IgG avidity (20%).

The diagnostic accuracy of low Ig G avidity versus high Ig G avidity in comparison with positive DNA by PCR revealed a sensitivity of 91%, specificity of 45.7, +ve PV of 60.4 , and -ve PV of 84.2. On the other hand, high avidity cases with Ig G negative and DNA-based positive test showed a specificity of 75% (C.I= 74-92), with -ve PV of 80%

IgG Avidity	IgG antibody levels			IgM antibody levels		
	Positive (> 1.3) No. (%)	Equivocal (0.7-1.3) No. (%)	Negative (< 0.7) No. (%)	Positive (> 1.2) No. (%)	Equivocal (0.8-1.2) No. (%)	Negative (< 0.8) No. (%)
Low Avidity (< 30%) (27.8±1.0) **94/160=58.8%**	16(36.4)	4(11.1)	74(92.5)	57(77.0)	5(25)	32(48.5)
Borderline Avidity (30-35%)(32.8±0.9) **14/160=8.7%**	7(15.9)	5(13.9)	2(2.5)	2(2.7)	7(35)	5(7.6)
High Avidity (> 35%)(39.3±2.4) **52/160=32.5%**	21(47.7)	27(75)	4(5)	15(20.3)	8(40)	29(43.9)
Total	44(27.5)	36(22.5)	80(50)	74(46.3)	20(12.5)	66(41.2)

Table 4: Differential distribution of the IgG and IgM levels compared to Ig G avidity patterns

		Nested PCR analysis	
Ig avidity	**Serology status (no.)**	**DNA positive**	**DNA negative**
low-avidity	IgM-negative (32)	22	10
	IgG-positive (16)	7	9
high-avidity	IgG-negative (4)	0	4
	IgM-positive (15)	3	12
Total	67	32	35

Table 5: Comparison of avidity test and nested PCR-assay to confirm ongoing or recent Toxoplasma infection in selected subjects

(C.I =51-95) and -ve LR of 1.33 (1.04-1.76) . High avidity and +ve Ig M and PCR DNA positive test revealed a sensitivity of 100% (C.I = 29-100), with low specificity of 25% (C.I =7-52), +ve PV of 20%, -ve PV of 100% and +ve LR of 1.33 (1.0-1.76).

Discussion

The antibody avidity represents the net antigen binding force. IgG avidity is initially low after primary antigenic challenge and increases during the subsequent weeks and months (20).

The findings in this study clarified that some cases had illogic serological findings. The presence of positive IgG or negative IgM associated with low IgG avidity and the presence of negative IgG or positive IgM in cases of high IgG avidity.

The diagnostic accuracy of low avidity in relation to Ig G positivity produced strong evidence to rule out old Toxoplasma infection suspected by the presence of positive IgG antibodies. Low avidity in the presence of Ig M positive antibodies showed significant +ve likelihood ratio in ruling in the diagnosis of early toxoplasmosis. High avidity results indicated that this test may provide strong evidence to rule out the presence of recent infection among our participants.

Jenum P et al (1997) and Pelloux H et al (1998) documented the improvement of diagnosis of primary infection with T. gondii in early pregnancy by determination of anti-toxoplasma IgG avidity, which has the ability to discriminate between recent and prior infections.(16,21) Petersen, E et al (2005) suggested that the combination of a Toxoplasma-specific IgM and the avidity of IgG antibodies had the highest predictive value regarding the time of infection (22).

Gras et al., 2004 found that 29 % of IgM-positive women had low-avidity IgG antibodies suggesting they had a recent infection. More importantly, 61.3 % of the IgM-positive women had high-avidity antibodies suggesting old infection (23). The apparent discrepancy in detecting infection status by IgM serology and avidity tests may be due to the fact that IgM antibodies may persist for months or even years following the acute phase of an infection in some individuals (23,24).

In this study, IgM was negative in 34% of cases of low IgG avidity. PCR test in these cases showed positive in 22 out of the 32 cases, supporting the avidity test results. Despite the presence of positive IgG in 17% of cases of low IgG avidity, yet the PCR test in these cases showed positive in 7 out of the 16 cases (40%).

This means that about half of these cases of high IgG represented early infection. This positive PCR reflects that negative IgM is not a guarantee for absence of recent infection and that positive IgG may be present with recent infection. Low IgG avidity itself is a good indicator in these conditions. PCR test was positive only in 3 out of the 15 cases of positive IgM and high IgG avidity (20%). This low rate of positive PCR reflects that positive IgM is not always a sign of recent infection.

The high sensitivity of low Ig G avidity denoted a good detection test and the high -ve PV implied a good exclusion test if high IgG avidity. On the other hand, high avidity cases with Ig G negative and DNA-based positive test results denoted that this test had enough diagnostic accuracy to rule out recent Toxoplasma infection.

Petersen et al., 2005 observed the presence of specific T. gondii IgM antibodies in the chronic stage of an infection in 61.3 % of the cases. The avidity test was highly sensitive and specific for detecting a recent T. gondii infection in IgM-positive cases. However, in sera with low- or borderline-avidity antibodies and negative IgM antibodies, the IgG-avidity test was potentially misleading, if used alone (22). Similarly, Montoya et al. (2002) reported high-avidity antibodies in 74.8 % of the IgM-positive serum samples from pregnant women during the first 16 weeks of gestation (24).

The introduction of the IgG avidity test in the diagnostic panel of acute toxoplasmosis reduced false-positive rates and unnecessary diagnostic and therapeutic interventions (25). On the contrary, Varilla IS et al 2009, reported that the IgG avidity test did not impact on incidence rate findings (26). It is also known that the maturation of the IgG response varies considerably between individuals and thus low- or borderline-avidity antibodies may persist for months to more than 1 year (27,28). A study from France found a mean IgG-avidity index of 0.2 in pregnant women infected within 5 months (Lecolier & Pucheu, 1993). In such patients, an avidity test result, if used alone, would have been misinterpreted as suggestive of an acute infection (29).

Relying solely on an IgG and/or IgM test to detect an acute infection may result in unnecessary interventions in pregnant women. Using PCR analysis to detect Toxoplasma DNA is neither easy nor available in different situations. It is advisable to employ additional tests.

Our study further validates IgG avidity test as an additional confirmatory method, most useful if high-avidity antibodies are detected in IgM-positive women and also in IgM-negative women with low-avidity antibodies.

To the knowledge of the authors, the current study was the first study in Saudi Arabia which highlighted the role of IgG avidity testing and raised the issue of multiple serological parameters for toxoplasmosis acute infection during pregnancy.

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Determining level and predictors of Family Planning Unmet Need in Mosul City, North of Iraq: a Cross-Sectional Study

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ABSTRACT

Context
Millions of women worldwide want to delay or stop their next birth. In spite of that they do not use any method of contraception or they use less effective methods. These women are said to have unmet needs for family planning.

Aim
The aim of the present study is to provide an estimate of the level of unmet need and determining predictors in Mosul City in the North of Iraq.

Methods and participants
A cross sectional survey was done among 1,786 currently married fecund women attending the immunization unit of the chosen primary health care centers. A standard questionnaire formula was used and filled by direct interview with the participants.

Results
According to the standard formulation the level of unmet need was 20.2%. While according to the expanded formulation 34.9% of women have unmet needs for contraception. Several factors were shown to have a significant impact on the level of unmet needs. These are maternal age at 30-39 years, urban residence, high maternal education, exposure to family planning programs and media, number of living children in the family and absence of a living boy.

Conclusion
The reported high level of unmet need can be used as a baseline data for further follow-up research. Effective family planning programs, better services delivered to the families, provision of modern contraceptives and counseling are mandatory.

Key words: Family Planning, Unmet need, Mosul City, Cross-Sectional Study.

Background

Family Planning (FP) is an important strategy in controlling population growth and promoting maternal and child health through an adequate spacing of births and avoiding unwanted pregnancy, especially among high risk maternal ages and high parities(1). One of the goals of FP and reproductive health programs is to ensure that women and indeed couples, have the right to decide whether to have children, how many and when to have them(2).

Contraceptive use has increased markedly in the recent years in most developing countries, as has the desire for smaller families, however, millions of women want to delay or avoid pregnancy but are not using contraception(3). These women are considered to have an unmet need for FP.(4)

The concept of unmet need points to the gap between a women's reproductive intentions and their contraceptive behavior(5,6). A woman has unmet need if she is having sex, could be pregnant, does not want to be pregnant and is not using a contraceptive method.(7,8)

While evidence is limited, some levels of unmet need are likely to exist in every country, developing and developed alike, even where FP is widely used.(9) In some countries with high fertility, women have low unmet need because their desire for children is high, therefore a little gap exists between their childbearing intentions and contraceptive use. For example, in Chad where contraceptive use is 4%, total fertility rate (TFR) is 6.6 births/woman and unmet need is 10%. On the other hand, countries with high contraceptive prevalence rate (CPR) have both low fertility (TFR is 2 births/woman) and low unmet need for contraception (6-7%) like Brazil, Colombia and Vietnam.(10)

Despite the increase in CPR over the past 40 years, many women remain unprotected against unintended pregnancy(11). Many of today's poorest countries still have high fertility and high unmet need for FP(12). In a study conducted in India in 1993, 69 out of 70 women have an unmet need for contraception, with sterilization being the first and only used contraceptive method(13), which results in neglect of the need of couples for spacing methods.

According to the standard formulation. The unmet need group includes all fecund women who are married or living in a non-marital union (and thus are presumed to be sexually active) who are not using any method of contraception and who either do not want to have any more children or want to postpone their next birth for at least 2 more years.(14)

The standard formulation does not identify the full extent of need for FP. (14) So, unmet need for FP includes in addition to the standard formulation, the traditional contraceptive users, such as withdrawal and safety period because of their limited efficacy and high failure rate (15). It also includes those women using a method incorrectly or using unsuitable methods, which is called the expanded formulation (14).

A lot of research has been done to measure the magnitude of unmet need in different countries all over the world(16), including some Arab countries like Egypt, Kuwait, Oman, Jordan and Sudan(8,17). In Mosul City in the north of Iraq no previous effort has been done to determine the level of unmet need for contraception. Accordingly, the aim of the present study is to assess the level and predictors of unmet need for FP among currently married women of childbearing age in this city.

Materials and Methods

Prior to data collection official permission was obtained from Ninevah Directorate of Health to facilitate data collection from the primary health care centers (PHCCs) that were involved in the study.

Mosul City, the center of Nineveh Governorate, is the third biggest city in Iraq with a total population of 1,317,594. It is divided by the Tigris River into right and left banks. Each bank is served by the corresponding health sector (i.e. right and left health sectors). The right health sector includes 13 PHCCs and the left has 16 PHCCS.

In this study, a cross-sectional design was adopted. Multistage non-random sampling technique was used, in which Mosul City was divided into two parts : right and left health sectors. From each health sector, three PHCCs were chosen to try to cover most of the city areas; north, middle and south.
Geographic distribution, differences in socio-economic background, security situation in the city and the population size in the catchment's area of each center, all were taken into consideration in the selection of the PHCCs. The unit of the present study was currently married fecund women of childbearing age (15-49 years) attending the immunization unit in the PHCCs at the time of the survey for vaccination of any of her children and living in Mosul City for more than three years. Unmarried, in fecund (18), nullipara and fecund with history of infertility were excluded.

Information was obtained from the women after informed consent was taken. A detailed questionnaire form was prepared depending on DHS modules and literature relevant to FP unmet needs of women at childbearing age. Reliability (repeatability) and validity of the form was assessed and proved to have a very good reliability and validity (84% and 85.5%) respectively.

In this study, the precise estimation of the sample size was done depending on the catchment areas of each PHCC, by following the equation of sample size determination in a simple survey that is $n = (Z^2 \times p \times q)/d^2$ (19).

Where
n : is the sample size.
p : is the proportion of women at childbearing age within the population
d : is the accepted limit of precision which equals to 0.05
Z : is 1.96
q: is 1-p

The sum results from the six chosen PHCCs gave the desired sample size, which was 1,572 women.

Because there might be a non-response, or some incomplete forms among the questionnaire results, the total sample size collected was 1,800 women, which makes about 3.2% from the total number of women of child bearing age living within the catchment areas of the chosen PHCCs. Data collection started on the 26th of September 2007 and continued to 31st of March 2008.

The information regarding each woman was transferred into code sheets. Data entry was done using computer Pentium IV. SPSS package version (11.5) was used for the statistical analysis.

In this study and according to the standard formulation the current FP unmet need group includes all fecund women who do not want to have any more children or want to postpone their next birth for at least two more years and who do not use any type of contraception . This group also includes pregnant and /or amenorrheic women whose current or most recent pregnancy was unwanted or mistimed (8,9). Unmet need for modern contraception was added to the standard formulation in order to calculate the expanded formulation of unmet need (20).

Backward stepwise logistics regression analysis was used to assess the significant factors associated with unmet need. P-value <0.05 was considered significant during the analysis.

Results

During the study period, 1800 questionnaire forms were filled. From the filled forms, 14 were excluded because they did not match the inclusion criteria mentioned in the study design, so the whole number of the forms used in the analysis was 1,786.

Among the 1,786 respondent women, 30.6 % were pregnant, 5.8% were amenorrheic and 63.6% were neither pregnant nor amenorrheic.

Table 1 demonstrates that according to the standard formulation, there are 360 women (20.2%) with unmet needs, 43.2% with met needs and 36.6% with no need, while according to the expanded formulation the study population is divided into 34.9% (623) with unmet needs, 28.5% with met needs and 36.6% with no need.

Considering the standard formulation there are 45% pregnant women, 9.5% amenorrheic and 45.5% neither pregnant nor amenorrheic women who all have unmet need for limiting births. On the other hand, there are 58.7% pregnant women, 7.2% amenorrheic and 34.1% neither pregnant nor amenorrheic women all having unmet need for spacing births, while in the expanded formulation the limiters comprise 29.0% pregnant, 6.1% amenorrheic and 64.9% neither pregnant nor amenorrheic. The corresponding figures for the spacers are 29.1%, 3.6%, and 67.3% respectively, (Table 2).

Table 3 shows backward stepwise logistic regression model for determining factors that are significantly associated with the level of unmet need among the study population. The following variables emerged as significant predictors of the unmet need level in the present study: Women's age 30-39 years is associated with low level of unmet need (p=0.006). Similarly, so are urban residence and exposure to FP programs and media (p=0.002 and 0.045) respectively. Women with a higher level of education show the same trend (p=0.010), while a small number of children in the family, and only one or no boy in the family, were associated with significantly high levels of unmet need (p= 0.045 and 0.033) respectively.

Discussion

To achieve the aim of the present study, a cross-sectional design was followed. This design has notable advantages, carefully balanced against disadvantages. Among the well known advantages of the cross sectional study are(21):

1. Describing distribution of the items under study i.e. unmet need for FP of married women, and its impact on the community.

2. It is useful in determining association between variables of interest and hence gives a hint for formulating a hypothesis for the causation of unmet needs for FP.

3. An important point that gives strength to the present study is the large, diverse and city-wide representative sample of currently married women as they represent a snapshot of the reference population that is caught in the survey net at one point in time and not distinguished until the results are examined. However, household surveys may give more informative results. In Mosul City it is not an easy task to carry out this type of survey because of the well known instable security condition over the last years.

When considering the findings of the present study, limitation should be taken into account which includes:

1. Causal direction cannot be determined which is one of the important disadvantages of the cross sectional study, therefore findings can provide direction for potential areas for more in-depth future studies
2. The extent of over reporting or underreporting of use or no use of contraceptive cannot be determined, although the study questionnaire demonstrates a good test and re-test reliability.

Unmet needs for FP are usually measured among married women (15-49) years by administering a questionnaire taken from standardized DHS questionnaire forms. As the present study is the first to assess the level of unmet need for FP of married women in the city, data derived from such a study could be used as baseline indicator for future programs. So, it is important to have a high confidence of data derived from this survey.

The unit of the present study were currently married women aged 15-49 years who were present at each day of the survey attending the immunization units of the 6 chosen PHCCs, where they could be considered a representative of the women's community in Mosul City.

The present study showed a high maternal response rate (97%) and the PHCCs participation rate was (100%). During data collection, a total of 1,786 women were interviewed. This sample size was higher than what was expected to be collected. This is probably due to high maternal response rate and the large number of women attending the PHCCs.

Over the past four decades, the measure of unmet need has been developed and refined drawing on advances in the conceptualization of the phenomenon, survey methodology, analytic tools and in-depth studies(16).

According to the standard estimation of unmet need (16,22) the level of current unmet need measured in this study was 20.2%.

Agha and Rasheed(23) in their research of unmet need for FP in Duhok City in the North of Iraq found that according to the standard formulation, the level of unmet need for FP was 29.3% which is higher than the level in the present study. This might be due to the difference in some aspects of their study design, as in Agha and Rasheed's research, a household survey was used, making the sample more representative of the community, so a higher number of women with unmet needs were seen.

Type of need	No. of women	%
According to the standard formulation		
Unmet need	360	20.2
Met need	773	43.2
No need	653	36.6
Total	1786	100
According to the expanded formulation		
Unmet need	623	34.9
Met need	510	28.5
No need	653	36.6
Total	1786	100

Table 1: Distribution of the study population according to their type of need, (September-December 2007)

Respondent women	Women with unmet need for limiting births		Women with unmet need for spacing births		Total	
	No	%	No	%	No	%
According to the standard formulation						
Pregnant	100	45.0	81	58.7	181	50.3
Amenorrheic	21	9.5	10	7.2	31	8.6
Neither pregnant nor amenorrheic	101	45.5	47	34.1	148	41.1
Total	222	100	138	100	360	100
According to the expanded formulation						
Pregnant	100	29.0	81	29.1	181	29.0
Amenorrheic	21	6.1	10	3.6	31	5.0
Neither pregnant nor amenorrheic	224	64.9	187	67.3	311	66.0
Total	345	100	278	100	411	100

Table 2: Distribution of women with unmet need according to the standard and expanded formulation with their pregnancy status and the type of unmet need, (September-December 2007)

Variables	ß	SE(ß)	Sig.	Exp(ß)	95% C.I for Exp(ß) Lower-Upper
Women's age	- 0.235	0.085	0.006	0.791	0.670 - 0.934
Residence	- 0.248	0.078	0.002	0.780	0.669 - 0.910
No. of living children	0.219	0.109	0.045	1.244	1.005 - 1.540
No. of living boys	0.187	0.088	0.033	1.206	1.015 - 1.433
Exposure to FP program	- 0.589	0.069	0.000	0.555	0.485 - 0.635
Women's education	- 0.212	0.090	0.010	0.811	0.710 - 0.987
Constant	- 0.225	0.359	0.050	0.798	

Table 3: Backward stepwise logistic regression model for prediction of unmet need level among the study population, (September-December 2007)

However, the level of unmet need in the present study is higher than that reported in Iran which was 7.6% in a study conducted by Ahmadi and Iranmahboob(24) in 2005. This is mainly due to the Iranian government policies towards population decline and rising rates of contraceptive use which have reduced the unmet need for FP in this country.

The figure measured in this study (20.2%) includes 9.4% for limiting and 10.8% for spacing. In Dar Al-Salam in Sudan Umbeli et al. (1) reported 30.7% of married women have unmet need for FP. This fraction was for spacing rather than for limiting which is similar to most of the Sub-Saharan African countries in which 65% of currently married women have unmet need for spacing births(25). This could be explained by the preference of large family size and high number of desired children in such a community.

Unlike the results in Sub-Saharan Africa, Calle et al.,(26) in Bolivia showed that, 27.6% of all married women in the year 1998, were classified as having unmet need for contraception with 20.6% for limiting and 7% for spacing births. They attributed that to the high TFR in Bolivia during 1998 which was equal to 5.6 births/woman.

The modification of the standard formulation definition of unmet need was done depending on the fact that traditional contraceptive methods are ineffective and may be associated with a high failure rate(16). This fact was well known before 1,429 years in Islam as said by prophet Mohammed (peace be upon him) when he was asked about traditional contraceptive methods.

The present study stated that unmet need for modern contraception was 14.7% which makes the level of current unmet need rise up to 34.9%. In the Dohuk study the expanded form of unmet need was 57.8%, probably due to the large number of traditional contraceptive users among Kurdish women in Dohuk City. Local traditions, religious causes and difficult access to FP services were blamed by authors as a cause for this high fraction(23).

Klijzing(9) in his study of unmet need for FP in France found that according to the expanded formulation, the level of unmet need was 13.5% which is much lower than that of the present study, since France is a developed country where most of the women rely on modern contraceptive methods, and only 6% of the Klijzing sample reported using traditional methods compared to 14.7% recorded in the present study.

Age of the women is an important factor in relation to unmet need for FP even in the shift from traditional to modern contraceptive use(27). In the present study this factor emerged as a predictor of the level of unmet need. Women who fall in the age range 30-39 years have a lower level of FP unmet need in a well shown significant way (p= 0.006).

This result could be attributed to the fact that a high proportion of women have been married at a young age (before twenties) which is normal in a conservative community like Mosul. So by reaching this significant age i.e. 30-39 years, the majority have completed their families and since their fecundity is still considerably high, they must use effective FP methods to prevent unwanted fertility. Klijzing (9) reported in his study that unmet need rises with age. The same result was shown among Kuwaiti women in which there was a strong association between age and the level of unmet needs (28). A different conclusion was reached by Ahmadi and Iranmahboob(24) where they stated that the age of women and unmet need are negatively related, which may be due to the fact that young women have not achieved their expected number of children .

Urbanization is another factor that is often included in the studies of unmet need for FP in developing countries whereas in developed countries it is of much less concern because even rural areas in the developed countries have good access to FP services and have a good deal of maternal knowledge about FP(15).

In the present study, living in an urban area is significantly associated with low level of unmet need (p= 0.002). The is true in studies conducted in Kenya by Magadi and Curtis (29), and in Kuwait(28). While a study conducted in Vietnam by Thang and Anh (30) recorded not much difference in the level of unmet need between urban and rural areas, since the proportion of women using modern contraception was almost similar in both settings. The use of contraception is not only dependent on the availability but also on the intensity and promotion of knowledge about modern contraceptives types.

The mean level of both empowerment indices of women (that are decision-making index and freedom of movement index) increase steadily and significantly with education. This conclusion was suggested by AL-Riyami et al, (17) in their study in Oman during 2004 about education and employment of women and their influence on contraceptive use. They also stated that, the relationship of empowerment indicators for contraceptive need and use, in combination with education, provided a more clear picture on contraceptive need and use.

Magadi (31) in her study in Kenya found that the level of both wanted and unwanted childbearing generally decreases with rising education. The present study showed a significant association between high maternal education and presence of low level of unmet need (p=0.010).

On the other hand, Westoff (8) who conducted a study in 2006 covering 58 countries worldwide, found no association between the level of unmet need and maternal education. These paradoxical results may be due to differences in the educational systems or other confounding factors such as religion, norms and culture which may be also effective across countries(9).

Speizer (32) in his study in Burkina Faso, Ghana and Kenya during 2006 found that countries with high TFR and high demand for children typically have low levels of unmet

need as do countries with low TFR and generally high contraceptive use.

Similar conclusions have been drawn by Hennink et al., (33) in their study in Urban Pakistan during 2001 when they said that the desired timing of the next pregnancy has a strong relationship with parity. In the present study backward stepwise logistic regression analysis has voted to the small number of living children in the family as a significant predictor of a high level of unmet need (p= 0.045). Absence of a living boy in the family shows a better association than the small number of living children (p= 0.033). Since almost all families in Mosul City prefer boys rather than girls, hoping that the boy will carry the family name and make it continue through his offspring; besides he may take care of his parents and help them when they become older.

Ahmadi and Iranmahboob(24) in their research found that despite other developing countries, women's preference in Iran was found to be for girls. As the majority of their offspring are boys.
It is a well known fact that mass media performs the knowledge function about contraception through exposure to FP programs on T.V., radio, internet or even newspapers(35). Confirming this opinion, the present study showed a highly significant association between the level of unmet need and exposure to FP programs on media (p=0.000).

The same result was indicated among Iranian women(24), also Devi et al., (18) in his study in India suggested that, exposure to FP messages in the mass media has a direct bearing on the need for FP.

Mass media programs encourage women to use FP when they no longer want children and may help some of these women recognize their needs for long-term FP and gain access to such services(32).

The outcome of the high level of unmet need found in this study can be used as a base line data for future research. This high level can be lowered through an efficient FP program with provision of modern contraceptives and FP counseling. Further household surveys are needed to further disclose the reasons that lie behind this problem.

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Prevalence of Non-Alcoholic Fatty Liver Disease (NAFLD) and its association with metabolic syndrome in adults people living in Aden

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ABSTRACT

Background and Aim: Non-alcoholic fatty liver disease (NAFLD) and metabolic syndrome (MS) have become important health issues in many countries. There is increasing interest in ultrasound-diagnosed NAFLD. The aim of this study was to evaluate the prevalence of non-alcoholic fatty liver and to explore the relationship between fatty liver and the metabolic syndrome in ultrasound diagnostic adults Yemeni people living in Aden.

Methods: A number of 140 adult Yemeni subjects were prospectively assessed. Questionnaires, physical examinations, laboratory tests (blood for lipid profile, fasting glucose, liver enzymes, viral serological markers and total blood count) and liver ultrasonographies were performed . Prevalence of the metabolic syndrome was defined by the National Cholesterol Education Program-Adult Treatment Panel III (NCEP-ATPIII) criteria were used to assess metabolic syndrome; fatty liver diagnosis was based on the ultrasound examination and exclusion of known etiologic factors responsible for liver disease, in accordance with the presence of an ultrasonographic pattern consistent with 'bright' liver (brightness and posterior attenuation of liver).

Results: The prevalence of fatty liver in the study subjects was 35%. Metabolic syndrome were found in 61.2% of cases with NAFLD. Subjects with NAFLD had higher values of BMI with wide waist circumference, and the risk for fatty liver in subjects with central obesity, diabetes, hypertension and dyslipidemia were found statistically significant.

Conclusion: There is a high prevalence of nonalcoholic fatty liver among certain population in Yemen, to which obesity, diabetes, hypertension and hyperlipidemia are closely relevant.

Key Words: Non -alcoholic fatty liver, metabolic syndrome, risk factors, adults..

Introduction

Non-alcoholic fatty liver disease (NAFLD) is a clinicopathological syndrome that ranges from simple steatosis to steatohepatitis, fibrosis or cirrhosis. It is characterized by diffuse or focal fat accumulation in the hepatic parenchyma of patients who deny any history of abusive alcohol consumption.(1) NAFLD may progress to end-stage liver disease and hepatocellular carcinoma.(2)
It is not possible to predict accurately which patients are at risk of progression and development of associated liver complications, but age is increasingly recognized as a predisposing element. The onset of the fatty liver is not well understood, and the leading physiopathological hypothesis links consumption of fat-rich foods and hepatic fat accumulation due to insulin resistance.(2,3)
Nonalcoholic fatty liver disease refers to the accumulation of fat, mainly triglycerides, in hepatocytes that exceeds 5% of the liver weight NAFLD can be primary or secondary, depending on the cause (2). Primary NAFLD results from insulin resistance and thus frequently occurs as part of the metabolic syndrome (MS).
Metabolic syndrome (MS) received a lot of attention recently because of its importance as a health problem and because of different definition created by several organizations as, WHO, IDF, and NCEP ATP111.
Patients with Type 2 diabetes, which accounts for 90 % of all diabetes, has become one of the major causes of premature illness and death, mainly through the increased risk of cardiovascular disease (CVD) (2) and MS further aggravate the situation.
The metabolic syndrome (MS) according to the new International Diabetes Federation definition (2004) includes central obesity plus any two of the following factors: raised triglyceride level, reduced high-density lipoprotein cholesterol (HDL-C), raised blood pressure or fasting

blood glucose (FBG)(3). Insulin resistance, together with obesity, hypertension and dyslipidemia, constitute a state of cardiovascular risk that is defined as metabolic syndrome. The most consistent data regarding NAFLD prevalence are those collected in the general population studies. These population surveys have defined NAFLD by biochemical criteria (increased serum aminotransferases and/or alkaline phosphatase and gamma-glutamyl transpeptidase) or by hepatic ultrasound and exclusion of known etiologic factors responsible for liver disease. Among the populational studies the most representative are the Third National and Nutritional Examination Survey (NHANES III), USA and the Dionysus study from Italy. Based on these studies, the prevalence of NAFLD is between 9% and 33.5%, and it is higher in obese people (range 56-86%) than in lean subjects 16%(3).

The aim of this study was to assess the occurrence of NAFLD in a sample of community-middle-aged and older adults living in Aden and to evaluate its association with the metabolic syndrome and its individual components.

Methods

The present cross-sectional study was performed using data on 140 adult people living in Aden aged ranged 35-65 years or older at the time of the study. These individuals were recruited to undergo health screenings at the private clinic between May 2006 and October 2007. NAFLD was diagnosed by means of a protocol that brought together clinical, laboratory and ultrasound examinations. Medical examinations were conducted to exclude individuals with clinical signs of active or past liver infection, inflammation or malignancies; to avoid patients with abusive alcohol consumption on the basis of the history provided; and to rule out any influence from hepatotoxic drugs. The laboratory tests included serum liver tests (aspartate aminotransferase [AST],alanine aminotransaminase [ALT], gammaglutamyl transpeptidase [yGT] and alkaline phosphatase [ALP]), hepatitis B serological tests (HBsAg, anti-HBc), hepatitis C serological tests (HCV-Ab) and total blood count. Serum fasting glucose (FBS), triglycerides (TGL), total cholesterol (CHL) and high-density lipoprotein [HDL]) were also obtained. All the above tests were performed as part of the routine clinical analysis. Each one was submitted to an abdominal ultrasound examination with a Honda HS 2000 device, using a convex 3.5 MHz probe. NAFLD was defined as a fatty liver found on ultrasound examination of non-drinkers in the absence of the following: consumption of possible hepatotoxic drugs, symptomatic or asymptomatic hepatitis B and C infection, and clinical findings compatible with other liver disorders, in accordance with the presence of an ultrasonographic pattern consistent with ‘bright’ liver (brightness and posterior attenuation of liver)(4).

Only subjects who gave their written consent were included in this study.

Categorical variables were analyzed by the chi-squared and Fisher exact tests, and $p < 0.05$ was considered significant.

Results

140 subjects fulfilled the inclusion criteria: 21 males and 119 females of mean age 55.0 years (SD = 5.0) and age range from 35 to 65 years. The way in which the sample was constituted probably accounted for the differences regarding age, in which the men were older than the women. NAFLD was found in 35% (n = 49) of the 140 subjects (Table 1). To characterize the metabolic state of the group, the five components of metabolic syndrome were quantified. of the obese diabetic subjects presented severely elevated serum fat, and arterial pressure levels (Table 2). The mean systolic and diastolic pressures were consistent with the observation that 62.4% of all the individuals had at least one abnormal measurement (> 130 or >85 mmHg, respectively) The hyperlipemic profile derived from the fact that 40% of the samples showed low HDL cholesterol (< 40 mg/dl for males and < 50 mg/dl for females). Accordingly, 56.7% of the subjects presented hypertriglyceridemia (> 150 mg/dl). Waist circumference exceeded the threshold for abdominal obesity (> 102 cm for males and > 88 cm for females) in 88.4% of the subjects, and 68.8% of the subjects with NAFLD had glycemia levels >110 mg/dl, above normal values (Table 2). Taking into account that the five components for metabolic syndrome (Central obesity, fasting glucose, low HDL, triglycerides and arterial pressure) were not influenced by gender in our analysis, the whole group was considered together in estimating the frequency of metabolic syndrome. In our study, out of 49 subjects of these middle-aged and older adults with NAFLD (61.2%), was found as presenting metabolic syndrome (i.e. four or more of the criteria fulfilled).

Taken together, the three most intense manifestations of NAFLD presented central obesity, higher levels of serum fasting glucose, total triglycerides and low HDL cholesterol than did the non-steatotic group (Table 3). It is important to draw attention to the fact that these serum metabolites were strong markers for metabolic syndrome.

Discussion

Non-alcoholic fatty liver disease (NAFLD) represents an emerging health problem with an estimated prevalence of 20% to 40% in the general adult population, and with a higher prevalence among obese and diabetic people(5). Prevalence of NAFLD may range widely as a function of varying definitions, selections, countries, ethnicity and diagnostic procedures. Hepatic ultrasonography has a good sensitivity and specificity (89% and 93%) in detecting steatosis comparing with the gold standard, liver histology(4). In the present study the diagnosis of NAFLD was based on the ultrasound examination and exclusion of known etiologic factors responsible for liver disease.
In the present study, the overall prevalence of NAFLD was 35.%. According to BMI, these range from 7.3% in the normal weight group and 45 % in the overweight and obese group with $p < 0.001$.

NAFLD	Sex (n=140)			
	M (n=21)	F (n=119)	No.	%
With NAFLD	09	40	49	35
Without NAFLD	12	79	91	64.8
Total	21	119	140	100

Abbrev: NAFLD (non-alcohol fatty liver disease); M (male); F (female).

Table 1: Prevalence of NAFLD in 139 adult Yemeni subjects

Variables	With NAFLD	Without NAFLD	P value
Number	49	91	<0.000
Age (years)	65±5.6	53± 3.4	< 0.05
Gender			
M	9	12	< 0.25
F	40	79	<0.000
BMI (kg/m2)	30.65±6.5	26.69± 4.51	< 0.001
WC (cm)	95± 8.6	83± 6.7	< 0.001
SBP (mmHg)	135.5± 19.5	124± 20.66	< 0.001
DBP (mmHg)	85.30± 30.2	74.50± 2.3	< 0.001
FBS (mg/dl)	125.30± 45.46	110.82± 35.6	< 0.001
HDL-C (mg/dl)	48± 13.9	53.12± 12.2	< 0.001
TG (mg/dl)	1 58.2± 0.1	137.6± 6.5	< 0.001
ALT (U/L)	32.4± 39.4	56.13± 76.3	< 0.001
AST (U/L)	35.6± 25.3	49.8± 7.2	< 0.001

Abbrev: NAFLD (non-alcohol fatty liver disease); BMI (body mass index); WC (waist circumstances); SBP (systolic blood pressure); DBP (diastolic blood pressure); FBS (fasting blood sugar); HDL-c (high density lipoprotein cholesterol); TG (triglycerides); ALT(alanine aminotransferase); AST (aspartate aminotransferase).

Table 2: Anthropometric, clinical and biochemical data in subjects with NAFLD

Metabolic syndrome components	NAFLD present No= 49	NAFLD absent No= 91	P value
Central obesity	88.4	54.6	< 0.001
BMI >30Kg/m2	55.3	16.7	< 0.001
High blood sugar	68.8	51.2	< 0.001
High triglycerides	66.7	34.4	< 0.001
Low HDL-C	40	30	< 0.001
Hypertension	62.4	43.6	< 0.001
Metabolic syndrome	61.2	33.3	< 0.001

Table 3: Prevalence of different components of metabolic syndrome in 140 adult Yemeni subjects according to presence or absence of NAFLD

There were significant differences between the subjects with or without NAFLD in the variables including: gender (females were predominant), age, BMI, waist circumference, blood pressure, fasting blood sugar, dyslipidemia and liver enzymes values (Table 2).

The main finding from this study was that approximately one in every three of these Yemeni middle-aged and older adults enrolled in the study presented NAFLD. Moreover, the present report indicates a prevalence of NAFLD that is notably higher than what was derived from studies carried out elsewhere on younger cohorts(5,6).

Compared with data in the literature, the present study suggests that the frequency of idiopathic NAFLD among these healthy, predominantly elderly Yemenis' was greater than among healthy, predominantly middle-aged Korean,(5) Japanese(6) and Italian(7) cohorts. Studies conducted in populations with westernized lifestyles have found prevalence of liver steatosis of approximately 20%.(8,9,10) This greater prevalence in our study

collaborates other reports(9,10) in which older age is described as an important risk factor for fatty liver disease, and it may indicate that the social and health conditions inherent to developing countries intensify the frequency of NAFLD. In addition, these results allow the elderly to be included in the general statement that liver steatosis is frequent even in the absence of other data suggestive of hepatic disorders(10). The present study highlights the association of hepatic steatosis with features of the metabolic syndrome, and the presence of NAFLD was significantly associated with a spectrum of findings compatible with impaired insulin action (Table 2). A series of physiopathological, clinical and laboratory investigations have supported the hypothesis that insulin resistance has a central role in the pathogenesis of NAFLD(11,12). In the present report, states of insulin resistance were expressed by means of fasting glucose levels. This is a rather crude indicator for insulin action, but it is of practical use for large surveys. Moreover, NAFLD has also been shown to correlate with the heterogeneous condition known as metabolic syndrome, which is broadly related to insulin resistance. It is likely that the high visceral fat content observed, which was reflected by the proportion of individuals with waist circumference measurements greater than the acceptable limits (almost 40% of the subjects), acted as a predisposing element in the development of NAFLD, as described elsewhere,(10,11,12). Moreover, these findings indicate that increased fat delivery and/or sustained endogenous biosynthesis in the liver are the most likely physiopathogenic mechanisms underlying the onset of NAFLD under our conditions, to the determent of the hypothesis of diminished lipoprotein secretion. This is because an accumulation of deep abdominal fat may lead to increased delivery of fatty acids to the liver, followed by increased synthesis and secretion rates for triglycerides and LDL particles, and by the onset of liver steatosis in susceptible individuals(14).
Diabetes and hypertension were the next two factors associated significantly with the presence of NAFLD specially in the overweight and obese subjects (Table 3).

Elevated liver enzymes levels are considered a consequence of liver damage due to fatty acid infiltration and inflammatory stimuli, and recent findings indicate that serum levels of these enzymes are associated with multiple components of the metabolic syndrome. Increases in ALT are positively associated with each component(15)

Our study indicates that the prevalence of NAFLD among Yemeni aged 35 years and over is greater than what is seen elsewhere. Also, our findings implicated metabolic disorders that are compatible with metabolic syndrome presenting the steatosis.

Metabolic disorders such as NAFLD, diabetes and MS are chronic diseases in which genetically susceptible individuals are exposed to an imbalance between energy needs and energy (food) intake. Concerted action by regional societies and public health authorities are needed to fight against over-nutrition as a cause of liver disease.

Conclusions

Central obesity, diabetes, hypertension and dyslipidemia have been reported significantly as risk factors in NAFLD, and their simultaneous presence significantly increased the risk of more severe liver disease. The prevalence of the metabolic syndrome increased with increasing of obesity, diabetes, dyslipidemia and hypertension in subjects presenting steatosis.

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Causes of blindness in North Jordan

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ABSTRACT

Objectives: To determine the most common causes of blindness in north Jordan among patients attending ophthalmology clinics.

Methods: This study was conducted at the major military hospital in north of Jordan (Prince Rashed Military Hospital) during two years between August 2006 and July 2008.

Results: The most common causes of blindness were found to be cataract, diabetic retinopathy, glaucoma, and others, with percentages of 50%, 20%, 15% and 10% respectively. According to age, glaucoma was the most common cause of blindness in the younger age group.

Conclusion: This study showed that cataract, diabetic retinopathy and glaucoma were the main causes of blindness and loss of vision. Unawareness of diabetic patients regarding ophthalmic examination, late presentation and fear of surgery in cataract patients and the poor compliance of glaucoma patients, worsen the problem of blindness, therefore I advise national or even a regional survey program to increase the awareness of blindness and its major causes.

Keywords: blindness, cataract, diabetic retinopathy, glaucoma.

Introduction

Blindness is defined as visual acuity of less than 3/60 in the better eye according to the World Health Organization definition(1). It is considered a major public health, economic and social problem in all countries. Many studies have been conducted to estimate the prevalence of blindness.(2-8)

Most blinding disease and patients reside in Africa and Asia (2) and some go on to say that 90% of world blindness occurs in developing countries(9). There are 55 million blind people worldwide and this is expected to increase to 75 million in 2020 (10). The increase in the number of blind people is attributed to increase in life expectancy and rapid population growth. The majority of global blindness causes are avoidable (10). In this study we determine the causes of blindness in north of Jordan.

Methods

This is a hospital based, prospective study which was conducted during a two year period. It was carried out at Prince Rashed military hospital in Irbid which is the major military hospital in north Jordan, during the period between August 2006 and July 2008. A detailed history including age, sex, medical, ocular history, previous eye surgery, family history and compliance with medication was taken from all patients.

Complete ophthalmological examination included Snellens visual acuity testing, anterior segment examination via slit lamp, intraocular pressure measurement via Goldman Tonometer, refraction under cycloplegia followed by post cycloplegic testing and posterior segment examination after mydriasis via indirect ophthalmoscopy. If the best corrected visual acuity was less than 3/60 (counting fingers at 3 meters) in the better eye, the patient is considered blind according to the WHO definition of blindness.

Results

A total of 400 blind patients were examined. Cataract was the major cause of blindness in all patients with a percentage of 50%, followed by diabetic retinopathy with a percentage of 25%, glaucoma with 15% and multifactorial causes were seen in 40 patients (10%).

The mean age of our patients was 53.2 years with females being more than males (220 females and 180 males) in a ratio of 1.2: 1.

In younger age patients (roughly below 40 years) glaucoma was the leading cause of blindness followed by cataract and diabetic retinopathy and some due to corneal opacity.

Cause	Number of patients	Percentage
Cataract	200	50
Diabetic retinopathy	100-	25
Glaucoma	60	15
Corneal opacity	15	3.75
Refractive errors	14	3.5
Age macular degeneration	6	1.5
Cortical blindness	2	0.5
Retinal detachment	2	0.5
Optic atrophy	1	0.25

Table 1: Causes of blindness

Country (ref)	First	Second	Third
Lebanon (3)	Cataract	Refractive errors	Corneal opacity
Japan (4)	Glaucoma	Cataract	Retinal degeneration
Ireland (5)	Macular degeneration	Glaucoma	Cataract
Netherlands (6)	Age related macular degeneration	Glaucoma	Cataract
Scotland (6)	Age related macular degeneration	Glaucoma	Cataract
Oman (8)	Cataract	Trachoma	Glaucoma
Hong Kong (15)	Cataract	Macular degeneration	Myopia
Australia (7)	Age related macular degeneration	Cataract	Glaucoma
South Africa (14)	Cataract	Trachoma	Glaucoma
Malaysia (16)	Cataract	Retinal degeneration	Refractive errors

Table 2: Main causes of blindness in different countries

Discussion

The prevalence of blindness differs from country to country depending on the nature, course and occurrence of ocular diseases(11). As blindness is the end stage of many disorders, (central or ocular diseases), comparison of causes of blindness between nations and countries may help the health care provider and governments to investigate the risk factors associated with blinding eye disorders which may help in adopting prevention programs.

In this study, the leading cause of blindness was cataract (50% of patients) followed by diabetic retinopathy (25%) and glaucoma (15%) which was similar to results regarding the most common leading causes of blindness in a study done in Amman at King Hussein medical center, while it is different in the sequence of causes to a study done in the south of Jordan.

Similar to other developing countries, cataract constitutes the main cause of blindness and it is more prevalent in the rural than in urban areas (3). Thylefors et al found the main causes of blindness in the Eastern Mediterranean countries to be cataract 45.2%, trachoma 25.7%, glaucoma 5.7% and others 23.4%. The main causes of blindness in a number of countries are shown in Table 2.

Keefe et al (4) reported that the low percentage of cataract as a cause of blindness in western countries is due to the high cataract surgery done for early cataract in addition to the ageing of population where age related macular degeneration predominates as a cause of blindness in the old age group. In our country cataract patients used to present late to ophthalmology clinics because of poverty and of the false belief that cataract should be extracted when it becomes mature, where complication of surgery is higher and the transition to lens induced glaucoma is increased.

Diabetic retinopathy was the second common cause of blindness evident in 25% of our patients. Blindness caused by diabetes mellitus is considered to be preventable and curable if discovered early. Patients with diabetes should be referred to ophthalmologists as early as possible before developing proliferative diabetic retinopathy when the time is late and if surgery is done it carries high rate of complications.

A substantial number of diabetic patients consider laser treatment harmful to their eyes and listen to non medical personnel, so we should

discourage this false belief in our educational media. This lack of knowledge and ignorance of the diabetic patients constitute a major cause of blindness and loss of vision which can be reduced dramatically through educating patients about complications of diabetes and benefits of laser treatment.

Glaucoma was the third common cause of blindness in our study being evident in 15% of our patients. Many patients with glaucoma present late as they are not aware of this silent vision stealer (13) and if they were discovered early, the compliance to their treatment (which is life long, unavailable in public hospitals all the time and sometime expensive) is not good which adds to the problem of blindness, and these reasons force some ophthalmologists, including the author, to do early surgery for glaucoma patients. So I advise a screening program for patients with high risk of developing glaucoma.

Fifteen patients in our study were blind due to corneal opacity, 6 patients secondary to corneal dystrophy, 5 patients due to trachoma and 4 patients due to post infective keratitis.

Trachoma is uncommon in Jordan, Lebanon and Syria but still highly prevalent in some parts of Iraq, Saudi Arabia, Qatar, and Oman(2) and is the second leading cause of blindness in Africa(14).

Refractive errors were seen in 14 patients, 10 had keratoconus and 4 had high myopia. Blindness caused by keratoconus is curable by corneal graft. Jordan has started a national program for organ donation after death including the corneas.

In about 1.2% (5) patients, the cause of blindness was due to age related macular degeneration. This disease is prevalent in western countries due to increase in life expectancy and the retinal pigment epithelium of dark skinned individuals (most of our patients) may protect against macular damage (5,6,9).

Other causes of blindness in our study were: two had cortical blindness, two had retinal detachment and one had optic atrophy as in Table 1.

Understanding the causes of blindness especially the avoidable ones, and the curative causes is important in order to decline the prevalence of blindness and keep individuals active and productive instead of blind and dependent.

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The risk of Denture Stomatitis in Type II Diabetes Mellitus in a Jordanian cohort

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ABSTRACT

Aim: The aim of this study was to investigate the prevelance and evaluate the risk of Denture Stomatitis in acrylic denture wearers suffering from Type II Diabetes Mellitus, in comparison with patients with normal glucose metabolism.

Patients and methods: 82 patients (31 men and 51 women) with Type II Diabetes Mellitus and a control group of 68 non-diabetic patients (25 men and 43 women) attended the prosthodontic clinic at Marka Medical Centre, Amman and the endocrine clinic at King Hussein Hospital. All patients were acrylic complete denture-wearers since at least one year.

The Clinical pictures of denture bearing mucosae were compared in both groups. Diabetic status was determined for each patient by thorough medical history and two readings of fasting blood sugar. Glycosylated Hemoglobin test was used to evaluate Glycemic control for the diabetic patients.

Results: Patients with Type II Diabetes Mellitus had a significantly higher prevalence of Denture Stomatitis compared with non-diabetic patients.

Conclusion: This study supports the view that Type II Diabetes Mellitus is a risk factor for Denture Stomatitis and could be a beneficial indicator for the early diagnosis of Diabetes.

Introduction

Denture Stomatitis is a clinical diagnosis of an inflammatory lesion in which there is a localized or generalized redness or hyperplasia of the oral mucosa underneath a removable denture (1).

Clinically, the identification of Denture Stomatitis can be classified using Newton's classification (2), as follows:
Type I - pin-point hyperaemia, or localized simple type of inflammation;
Type II - more diffuse erythema, confined to the mucosa in contact with the acrylic plate;
Type III (Granular type) - granular inflammation or "Inflammatory papillary hyperplasia".

Denture Stomatitis is usually symptomless, and the affected patients are often not aware of the condition. However, they may complain of mucosal bleeding and swelling, a burning or painful sensation, or unpleasant taste and dryness in the mouth(3). However, they usually present to prosthodontic clinics complaining of complaints other than pain, for example they may complain about a poorly fitting, fractured, worn denture, overextended, etc.

Although the etiology of Denture Stomatitis is multifactorial, it is generally assumed that Candida Albicans and related species play a major role in initiating, maintaining and aggravating the disease (4, 5). However, mechanical irritation from the denture, or bacterial infection, as well as a wide range of local and systemic predisposing factors, may also be involved in its pathogenesis (3, 5, 6). Thus, it has been assumed that Diabetes Mellitus could increase susceptibility to oral candidioses (7, 8) and to the harmful effect of mechanical irritation (9,13).

According to different authors, the prevalence of diabetes is about 10-30% among older adults (10). There are two major types of diabetes, insulin-dependent diabetes mellitus (Type I), which occurs mostly in children and teenagers, and non-insulin-dependent diabetes mellitus (Type II), which occurs in older people.

Patients and Methods

82 patients (31 men and 51 women) with Type II Diabetes Mellitus and a control group of 68 non-diabetic patients (25 men and 43 women) who were acrylic complete denture-wearers and who attended the prosthodontic clinic at Marka Medical Centre and the endocrine clinic at King Hussein Hospital were included in the study.

All patients in both groups had worn complete acrylic resin dentures for more than one year. No patient in

Group	Number	Women	Men	Men's Age	Age range
Diabetics	82	51(62.2%)	31(37.8%)	61	41-85
Controls	68	43(63.2%)	25(36.8%)	59	38-87

Table 1. Age and sex of diabetic patients and controls

				Denture cleanliness		
Group	**Age of dentures**	**Wearing at night**	**Traumatic dentures**	**Excellent**	**Fair**	**Poor**
Diabetics	4.9	55 (67.1%)	39 (47.6%)	18 (22.0%)	36 (43.9%)	28 (34.1%)
Controls	4.2	47 (69.1%)	35 (51.5%)	15 (21.5 %)	34 (48.5%)	21 (30.0%)

Table 2: Denture conditions in diabetic patients and controls

Glycemic control	Frequency of Denture Stomatitis
controlled (20)	9 (45%)
fairly controlled (50)	26 (52%)
uncontrolled (12)	10 (83%)

Table 3. Relationship of quality of glycemic control to frequency of Denture Stomatitis

either group had received antibiotics, steroids or immune therapy, or used any antiseptic mouth wash, for the two months before entering the study.

Diabetic status
Diagnosis of diabetes was based on the following criteria:
1. Patients who were known to be diabetic on diet, oral hypoglycemic agents or insulin.
2. Patients who were not known to be diabetic were assessed thoroughly by medical history, physical examination and two readings of Fasting Plasma Glucose level. Fasting Plasma Glucose level of more than 126mg/dl was consistent with diabetes mellitus, while readings less than 100mg/dl were considered normal (non diabetic). None of the 68 non-diabetics had a family history of diabetes.

In addition, each diabetic patient had a blood sample assayed for Glycosylated Hemoglobin. The Glycosylated Hemoglobin level (HbA1C) is one of the indicators of Glycemic control, which reflects Glycemic control over the previous 2-3 months. The quality of Glycemic control was designated as "controlled" when the glycosylated Hemoglobin level was <6.5%, and "fairly controlled" when the level was 6.5-8.5%, and "uncontrolled" when the level was >8.5 %.

Dental examination
All subjects underwent a routine oral examination. The patients with Denture Stomatitis were categorized according to the classification of Newton (2). The occlusion and fit of the dentures were estimated according to Bergman et al (14), and denture cleanliness according to Ambjornsen et al. (15) The subjects were questioned about denture-wearing habits and about the age of their dentures.

Statistical analyses:
The results were assessed using the Student's t test and U-Gauss test where appropriate. Pearson's correlation coefficient was used to measure the associations between the quality of Glycemic control and the frequency of occurrence of Denture Stomatitis.

In all tests a P value<0.05 was considered significant.

Results

Diabetics and controls did not differ statistically with regard to age, sex, age of the denture, occlusal conditions, denture cleanliness, and frequency of wearing dentures at night (Tables 1 and 2).

All the diabetic patients suffered from Type II Diabetes Mellitus. The quality of the Glycemic control was "controlled" in 20 (24%), "fairly controlled" in 50 (61%), and "uncontrolled" in 12 (15%) patients.

Fifty one (62.2%) diabetic patients had Denture Stomatitis compared with twenty-three (33.8%) controls. The difference between the groups was statistically significant (P value <0, 01). (Figure 1 - next page).

Frequency of Diabetes Mellitus differed between different classifications of Denture Stomatitis; Type I occurred more commonly in non-diabetic patients; Type II and Type III occurred more in diabetics (Figure 2 - next page).

There was a significant correlation between the quality of Glycemic control and frequency of Denture Stomatitis. "Uncontrolled " disease was more frequently associated with Denture Stomatitis, than with the "fairly controlled" or "controlled" cases (Table 3).

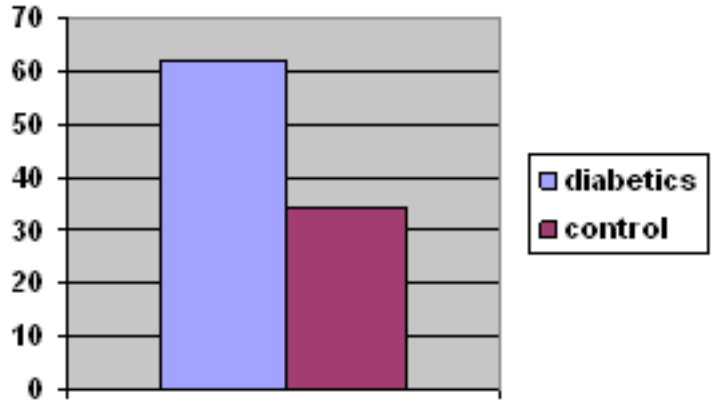

Figure 1. Frequency of Denture Stomatitis in diabetic patients and controls

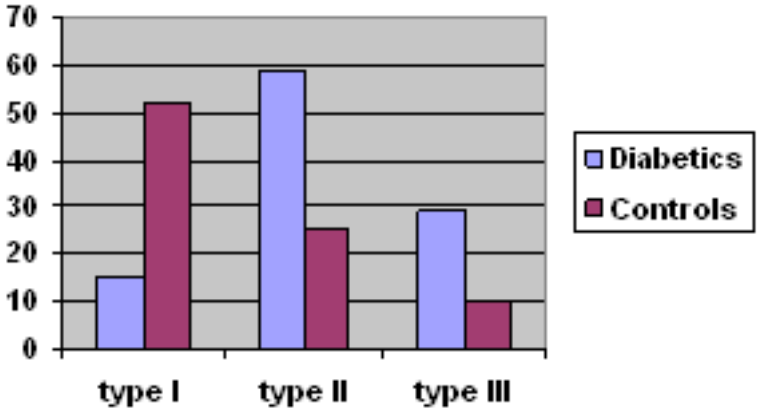

Figure 2. Frequency of occurrence of different types of Denture Stomatitis according to Newton's classification in diabetic patients and controls

Discussion

The prevalence of Denture Stomatitis ranges from 25- 65% among acrylic denture-wearers (3,5,6). The results of this study support a positive relationship between Type II Diabetes Mellitus and the presence of Denture Stomatitis, as the latter occurred more frequently and was more severe in diabetic patients than in non-diabetic patients. The mucosal membranes of the body, including the oral cavity, are commonly colonized by yeasts. It is now widely accepted that about 40-60% of healthy adults may harbor commensal candidal microorganisms in the oral cavity without causing any clinical signs or symptoms of candidosis (20, 21).

Controversy exists as to whether the candidal comportment on the palatal mucosa is greater in diabetic patients than in non-diabetics and whether density of Candida growth is related to the quality of glycaemic control. Adherence of Candida to epithelial cells is considered to be the initial stage in the infection (19, 22). Thus, a close relationship has been established between the adhesive properties of various Candida species and their ability to cause disease (24). It is assumed that the adhesion molecules of Candida species are mannoproteins (23). More recently it has become evident that the nature of the host cell receptors is important for the ability of candidal species to adhere (25). The finding that the adherence of Candida albicans was increased to palatal epithelial cells from diabetics corresponds to a study of Darwazeh et al (13), who demonstrated a 55% increase in candidal adherence to buccal epithelial cells of diabetics. Glucose forms chemically reversible glycosylation products with proteins in the tissues when the blood glucose level is high (26). It is possible that accumulation of such glycosylation products in epithelial cells may increase the number of available receptors for Candida on the surface of the epithelial cells.

In the present study there also was a positive correlation between the quality of glycaemic control and the frequency of Denture Stomatitis.

Conclusion

The results of this study suggest that Denture Stomatitis is more common and more severe in patients with Type II Diabetes Mellitus than in patients with normal glucose metabolism. One of the reasons for this might be impaired granulocyte function associated with diabetes (10). The increased adherence of fungi to palatal epithelial cells of diabetic patients might be another predisposing factor.
This study supports the view that Type II Diabetes Mellitus is a risk factor for Denture Stomatitis and could be a beneficial indicator for the early diagnosis of Diabetes.

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Opening my eyes to the value of research in general practice

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An excellent healthcare system must be underpinned by excellent clinical research". The words seemed to jump off the screen as Ms Melinda Soos, from the Department of General Practice at the University of Melbourne, spoke about the international recognition of the lacunae in clinical research in primary care and the excellent opportunity that exists for general practitioners to facilitate research in practice.

The session was part of my exposure to research that is being conducted in general practice in Australia. I was a member of a team of seven GP trainers from India and Nepal who were visiting Australia on an Australia Leadership Award fellowship for eight weeks. The objective of the fellowship was to strengthen the health system through general practitioner education in India and Nepal. The fellowship was facilitated by the Nossal Institute for Global Health and funded by AUSAID. General Practice/ Family Medicine is a relatively new specialty in India and faces the same challenges faced 50 years ago in countries like Australia where it is well established now. It is a poor cousin of the other specialties, made so by the lack of acceptance of its value by the single subject specialists, inappropriate understanding of its domain by the medical profession, inadequate training, the presence of thousands of MBBS doctors with no specialty training in general practice, the lack of a national organisation for general practice with excellent standards, the minimal exposure to general practice for undergraduate medical students, the glamour of some of the other specialties compared to general practice and the absence of a clear career pathway that is financially competitive.

There has been a lot of discussion about the future of general practice and the ways to elevate its status in India. How can we get some of the brightest students to take up general practice as a career? What can be done to make it an academic specialty in India, that is acknowledged and respected by other specialists? How can general practice play a pivotal role in the management of diseases in India? What are the moves that will make the academia in the medical field take notice of the relevance of general practice? How can general practice attract funding that is crucial for it to develop and establish itself in a teaching hospital? How can the other specialists be brought along as collaborators and not opponents in this venture?

My visit to the Department of General Practice of University of Melbourne was an eye opener in many ways. Though I have been exposed to research in the past, it was for the first time that I saw the value of cutting edge research in primary care. A talk with Associate Professor Meredith Temple-Smith, the research training coordinator, enabled me to understand the breadth of research that was being conducted in the department. I was amazed to see the pioneering role the department had taken to address various health problems from a primary care perspective, which is so different from that of the specialist. I saw an aspect of general practice which was absolutely fascinating. She encouraged me to build up capacity for high quality research in primary care in my institution. Professor Jane Gunn, Department Head and the Director of the Primary Care Research Unit, shared with me her own journey of a career in research and the value of having a PhD. It was really inspiring for me to listen to her experiences and share some thoughts on research in depression in general practice. I was quite fascinated to learn about the diamond study which is providing valuable information about longitudinal follow up of patients with depression, a subject that has been very close to my heart.

Along with these opportunities to spend time with some of the faculty at the department, we also had classes on specific topics that dealt with various aspects of research in primary care. Associate Professor William Wong impressed on us the strategic importance of research. He took sessions on research methods which included a group work, an overview of teaching evidence based medicine and the intricacies of paper writing to publish. His tips about choosing the right journal and making the article publishable were invaluable. I soon realised that we had the privilege of being taught by which included a group work, an overview of teaching evidence based medicine and the intricacies of paper writing to publish. His tips about choosing the right journal and making the article publishable were invaluable. I soon realised that we had the privilege of being taught by some of the best experts in primary care research. Dr. Lena Sanci, who leads the Department's research program on young people's health in

primary care, briefed us on building a large research program, something which has great potential in India.

We were given an introduction to the world of systematic review by Ms Miranda Cumpton from the Cochrane library. In addition to the information about the opportunities to get involved in a Cochrane review, it also exposed the lack of excellent research in India and the great opportunity for general practitioners to address this gap. Learning the variety of topics in which research is conducted, showed me how primary care physicians are able to be agents of influence and change in a wide spectrum of diseases. Ms Melinda Soos, who coordinates the Victorian Primary Care Practice -Based Research Network, explained how the profile of people and problems with which they present to GPs are different from those at the hospital. She impressed upon us the mandate for a different kind of research in primary care. She stressed that the object of producing research is to change practice, enabling me to appreciate the significant role that primary care research can play in improving the practice of medicine in India. Of course the lack of time and interest are some of the challenges that we will face in getting the GPs in India to form a research network. However, it is encouraging to know that these challenges were faced in Australia also and have been successfully overcome.

A class by Associate Professor Meredith Temple-Smith gave us an insight into the world of writing a proposal for a grant. She shared with us her experience and wisdom gathered over the many years of applying for research grants. This will be of great use to us in our future attempts to receive funds for research in our countries. I am grateful to her for sharing the success stories, the rejections and the attitude that has to be developed in applying for grants. She also took a session on supervising post graduate research which was practical and interactive. I have not received any training in the past on this subject though I am involved in assisting students in research. What I learned will be of great value to me and my colleagues who help students with their research. I also spent some time with Dr Grant Blashki, the Department's knowledge transfer coordinator, because of a common interest in mental health. He took me through the exercise of doing a mental map to see why, when, on what topic and how I could do research - a simple but quite effective tool to decide what kind of research I should be doing. Former Head of Department Professor Doris Young took time to be with us and challenged us with all her enthusiasm to take general practice forward to greater heights in our countries. She also reiterated that research will play a key role in the development of general practice.

At the end of my exposure to research in primary care in Australia, I return with rich experiences. The staff of the Department of General Practice has taken great pains to impress upon me the strategic importance of research. Their sessions and the depth of wisdom and experience that they shared with us will be of tremendous use to me. Some of the key learning points for me through this exposure to primary care research are:

1. Research in primary care is an area of great need which needs focussed attention of academic family physicians in the developing world.

2. Cutting edge research with publications in leading journals will elevate the status of the specialty in academic medicine in these countries.

3. Collaborative research with other specialties is strategic to foster empowering relationships with other specialities in institutions where family medicine is a new specialty with relative young faculty.

4. Most of the guidelines for management of common conditions in primary care in the developing world are based on recommendations from the developed countries. Family Medicine should take the lead in conducting relevant research that will result in treatment protocols that are of low-cost and effective.

5. Academic family physicians in the developing world should view research as critical for the growth of the specialty and not an unpleasant addition to the heavy clinical work that they have. Protected time should be given to the faculty for research without the reluctance that is seen in many centres now.

6. The long term relationship that family physicians have with their patients who live close to their practices is an ideal set up for longitudinal studies. The patient-centered relationship that is unique to family medicine is ideal for these studies.

7. Excellent research in primary care can be done with low cost with major implications for clinical practice.

I am convinced that research will play a major role in improving the status of the specialty in India, in getting recognition as an academic specialty, in bringing other specialists to work in collaboration with us, to attract the best students to consider this as an exciting career and most of all- to address the problems faced by our country that need to be addressed by excellent research in primary care. I envisage research to be the lever that will elevate the status of the specialty in India attracting the best in the medical field and providing solutions to the health needs of the country that are effective, relevant and affordable.

Factors Affecting the Choice of Maternal Health Services in Port Said City, 2007

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ABSTRACT

Objectives: This study examines factors affecting the choice of maternal health services in Port Said City.

Methods: A house-to-house survey of 225 women in Port Said City, a northeastern Egyptian city located 200 kilometers from Cairo the capital of Egypt, was carried out to determine the maternal factors associated with this choice. The variables examined included age, duration of marriage, education, occupation, income, parity, husband's education, and living distance from the health service.

Results: The analysis showed that socioeconomic status of the family, distance from the health service, occupation and education of the mother were the strongest determinants of the choice of maternal health service used, respectively.

Conclusion: In conclusion, the importance of family income, mother's occupation and education as strong discriminating factors of the choice of MCH services, found in this study deserves to be further considered. The younger and more educated mothers who utilized the private MCH services should be approached to further investigate the reasons for such choice. The availability and accessibility of these services, coupled with health education programs, could have contributed greatly to such a practice.

Maternal health services are essentially promotive and preventive and provide avenues for the early detection of mothers at high risk of illness and mortality. As the majority of patients utilizing such services are usually not ill, and pregnancy is most frequently an uneventful physiological process, it seems logical therefore to hypothesize that, given the slightest constraints; maternal health services would be underused. Previous studies have implicated mothers' education, duration of marriage and certain physical-access variables as strong determinants in the use of maternal health services in some countries of the Eastern Mediterranean Region.[1] Scanty information exists on the utilization of Antenatal care services as a part of maternal health services in Port Said.[2, 3]
Egypt has achieved an impressive 68 percent decline in child deaths in the past 15 years. Investments in health services for mothers have helped improve care for pregnant women, made childbirth safer and increased the use of family planning services. As a result, thousands of children's lives have been saved.[4]

Through the Antenatal care program provided by the government, comprehensive primary health care services are provided for the target population groups of women during the fertile years of 16-45. These services are offered in the facility, in the community, and at home. Mother health care services are delivered through the following programs: antenatal care, postnatal care, family planning, social care, and health education. These programs are backed by laboratory investigations and by drug prescriptions and dispensing.[4]

The primary health care approach adopted in Egypt to achieve health for all by the year 2000 has brought maternal and health care services nearer to the people, even in the remotest areas. However, reports have shown that health service utilization is determined not only by its availability but by a number of other factors. For instance, in spite of the equitable distribution of primary health care and maternal health services, place of residence has been an important factor in their utilization. The rural populations were found to make greater use of maternal services than those in urban areas.[2]

The present study examines the utilization patterns of the Maternal Health services in Port Said. It also compares the characteristics of users and non-users of the private and government health services and elucidates factors that determine the choice of service.

Materials and Methods

A cross-sectional study was conducted in Port Said, a northeastern Egyptian city located 200 kilometers from Cairo the capital of Egypt, during March and April 2007. Port Said has approximately 80,000 inhabitants with a male to female ratio of 1.1:1.

A house-to-house study of households in this city was carried out, and women of child-bearing age were selected. 225 women were randomly selected and satisfied the inclusion criteria. A structured questionnaire was administered by the investigator to all the selected mothers. The questionnaire included items of information on the demographic characteristics of the mother, her fertility history (including history of the most recent pregnancy), utilization pattern of Maternal Health services and possible constraints hampering utilization and finally place of delivery and related factors.
The data were processed on a Statistical Software Package (SPSS). Descriptive summary statistics, such as mean and standard deviation, were computed for continuous variables and proportions for nominal characteristics of the women. The chi-square test was used to assess the statistical significance of association between any two nominal variables. In order to determine which variables distinguished between women using private hospitals, government hospitals and primary health care and services, the discriminant analysis procedure was used. All statistical tests of significance were at the 5% probability level and a confidence interval of 95%.

Results

The demographic characteristics of the 225 women interviewed in this study, categorized by their choice of maternal health service, are presented in Table 1 (next page). A univariate analysis showed a statistically significant relationship between each of the variables, education, occupation, income, husband's education, and the choice of health service, while it did not show significance for age, parity, or duration of marriage.

It was found that 40.4% of the subjects used private clinics, and 3.6% used the maternal health services located in a hospital setting, while the majority (56%) utilized maternal health services in primary health care centers (PHCs).

A high proportion (69.5%) of those who utilized the private clinics had high education, compared to 28.8% and 1.7% who used government primary health care clinics and maternal health services in government hospitals respectively.

Most of those utilizing maternal health services in primary health care were either illiterate or could only read and write and their husbands had secondary or intermediate education. They were predominantly housewives (70.3%).

A percentage of 81.3 of the studied women had a family income of less than 300 Egyptian pounds a month.

Women who did not use the government maternal health services, either at the primary health care clinic or the general hospital, thought distance, was a factor in their choice of health service. However a sizeable proportion of those utilizing the private clinics travelled more than 5 kilometers to receive the service. Table 2 (page 33) shows the distance to hospital, family income and choice of health service. There is a statistically significant association between each of these variables and the type of health service chosen ($p < 0.001$).

A combination of socio-demographic and access variables that best predicted the choice of MCH services, determined in a stepwise discriminant analysis procedure, showed monthly income as the best discriminant variable. This was followed by the distance, mother's education, husband's education, and occupation respectively. The other variables were not statistically significant.

The place of delivery of the most recent child by mother's characteristics was detected and about 2.5% delivered at home, 97.5% by skilled attendants. Multiparous, low-income housewives were those who delivered at home.

Characteristics	Government		Private Clinic	Chi-square
	PHC	Hospital		
Age years				
15-19	4	0	2	
20-24	30	4	26	X2 = 39.62
25-29	52	2	33	p>0.05
30-34	22	2	28	
35-39	16	0	5	
40-44	2	0	0	
Duration of marriage (years)				
0-4	63	4	45	
5-9	32	3	35	X2=30.833
10-14	11	1	9	p>0.05
15-19	6	0	2	
20+	4	0	0	
Education				
Illiterate	1	1	0	
Read and write	3	1	0	X2=34.69
Primary	1	0	1	p<0.05
Intermediate	10	0	4	
Secondary	94	5	45	
University	17	1	51	
Occupation				
Professional	5	1	40	
Clerical	64	4	27	X2=55.85
Housewife	4	0	5	p<0.05
Unskilled	52	3	19	
Student	1	0	0	
Parity				
1	46	4	34	
2	44	2	28	X2=4.31
3	29	1	17	p>0.05
4	5	1	11	
>4	2	0	1	
Husband's education				
Intermediate	2	1	1	
Secondary	91	5	49	X2=13.97
University	33	2	41	p<0.05

*No Husbands were illiterate, read and write only, or had primary education

Table 1:The Distribution of Women by Demographic Characteristics and Type of maternal health service used (n= 225)

Variable	Type of service			Chi square
	PHC	Hospital	Private clinic	
Distance (Km)				X2=67.97 p<0.05
<2	51	3	20	
2-5	72	3	26	
>5	3	2	45	
Family monthly income				X2=80.84 p<0.05
<100	3	1	0	
100-300	91	4	16	
301-500	32	3	53	
501-1,000	0	0	20	
>1,000	0	0	1	

Table 2: The relationship of accessibility variables to the choice of maternal health services (n=225)

Discussion

The result of a univariate analysis of this study has shown that statistically significant relationship exists between each of the variables, health income, distance to facility, education, occupation, husband's education, and the choice of maternal health service, while it did not show significance for age, parity, or duration of marriage.

Univariate analysis that implicated these variables could only provide a preliminary idea of which variable has an important association with the choice of MCH services. The discriminant analytic procedure used has an advantage over the univariate analysis, because it selected potential determinants after adjusting for other variables in the study. Income was found to be the first determinant for the choice of Maternal Health Care facility.

The result of this discriminant analysis highlights income, distance, mother's occupation as the strongest determinants of the choice of MCH services, after adjusting for all other variables. The high classification rate achieved by the three variables in the analysis when no distinction is made between MCH services in government, hospital and primary health care settings, is indicative of the relevance of these three variables.

These findings were not in consonance with previous reports,[5,7-10] where the government-provided MCH service is preferred by most, because of its proximity to the mothers and affordability, since it is a free service. It was stated in these studies that most women who are illiterate, older and with a poor family income and long duration of marriage are the majority of those who resort to traditional birth attendants and private MCH services managed by midwives (classified in this study as private clinics). These people even travel long distances of more than 15 kilometers to receive such services. The only explanation for this practice is that the women found it difficult to change their habits, having been used to those services before the advent of the government service. Private clinics had been introduced before the establishment of the government MCH services, and the women patronizing them who were over 35 years old may have found these services satisfactory enough for their purpose.(11) Different settings in which our study had been conducted, and the misconception among Egyptian women that private care is always better than primary health care, may explain such diversity of frequency of choice of Maternal Health Care facility.

The factors identified are consistent with previous studies, which report multiparity, social class, transportation problems, age and reported diseases as factors that account for the differential use of health services.[9,12-14] Education and family income are good indicators of socioeconomic class. The multivariate analytic procedure used in this study has selected mother's education and occupation as the best variable among all other variables used in determining social class. A study conducted in Bahrain also emphasized socioeconomic status and mother's education as factors influencing the use of maternal and child health services.[15] Although the educational level of the people of Egypt have increased tremendously in the past 30 years, they still prefer utilizing facilities in the private section if they could afford it.

The utilization of maternal health services varies across different cultures for a variety of reasons.[1] In conclusion, the importance of family income, mother's occupation and education as strong discriminating factors of the choice of MCH services, found in this study and consistent with the previous studies, deserves further comment. The younger and more educated mothers who utilized the private MCH services should be approached to further investigate the reasons of such choice. The availability and accessibility of these services,

coupled with health education programs, could have contributed greatly to such a practice.[11,17]

The low prevalence of deliveries at home (2.5%) found in this study is a good indicator of an increased use of modern health services in the city. Previous investigators have reported a prevalence of home deliveries as high as 80% in the rural areas of Egypt such as Menoufiya,[18] while others have found that only 39% of Egyptian women are attended by trained healthcare providers during pregnancy and labor.[19] This large decrease in the percentage of home deliveries is a clear manifestation of the impact of the primary health care approach. Women not attended by skillful delivery of care were found to be mostly of lowest education and older age. These are, most probably, the mothers who were used to this system before the advent of modern private or government MCH services.

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An analysis of a representative series of cerebral palsy cases

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ABSTRACT

Context and Purpose: This paper could contribute to a greater precision in defining the regional and global epidemiology of cerebral palsy by describing its impact in the setting of a child neurology clinic. The social and economic impact of Cerebral palsy is enormous in both the industrialized and developing settings. Extant and current literature from most developed settings intimate the controversies and difficulties encountered in attributing causalities to linked antecedents and risk factors.

Although the neuropathology in cerebral palsy is static and non-progressive, its epidemiology is dynamic, panoramic and setting variable as suggested by several initial and revisited investigations from various developed settings. In most developing settings however, its epidemiology has not been previously determined. In this paper a representative series of cases of cerebral palsies seen in a child neurology clinic is described.

Method and Setting: A prospective review of CP cases seen in a child neurology clinic in West Africa within five years.

Results: 341 cases met the specific inclusion criteria and were analysed. Most cases presented overtly in the first year of life with the mother being the child's accompanying relative to the clinic. The males were affected most, endogamy was determined in 32.55% of the cases. The first child was implicated in most cases. The predominantly featured prenatal antecedents were delivery difficulties, compatible intrauterine infections and caesarean sections, whereas, severe perinatal asphyxial events, neonatal septicaemias and prematurity related factors were the predominantly featured perinatal antecedents. In the postnatally acquired subsets, catastrophic febrile illnesses related neurological sequelae were the most compatible causal factors.

The symmetrical spastic tetraplegic form of cerebral palsy was the most common form encountered at 66.86%. Remote symptomatic seizures, failure to thrive, and visual, speech, auditory, urinary and respiratory difficulties were the other most obvious associated difficulties. Microcephaly was detected in 31.96% and Macrocephaly in 2.05%.

A profile of associated congenital anomalies, malformations, dysmorphic and unusual features consistent with that described previously were over-represented in this series.

Features on transfontanel ultrasounds such as ventriculomegaly, hydrocephalus, cerebral atrophy, periventricular leucomalacia complex, cystic parenchymal haemmorragic infarctive lesions, periventricular flares and echodensities, which portends neuromotor sequelae in addition to normative features, were evaluated further, clarified, corrected and confirmed at CT.

Native and contrast CT acquisitions of subsets, reveals severe bilateral ventriculomegaly and cerebral atrophy to be predominantly featured in spastic tetraplegia, non-progressive cerebellar ataxic, tonic and spastic diplegia.

Whereas in congenital and acquired hemiplegia, cerebral infarctions and poroencephalic cysts were the principally associated phenomena.

Ventricular septal defects, patent ductus arteriosus, and Tetralogy of Fallot were the potential haemodynamically relevant congenital structural cardiac lesions detected with exact certainty. Anaemia, Leucocytosis, thrombocytosis, high ESR and and variable morphological inconsistencies were the common accompanying haematological features. The other laboratoryfeatures were non-specifically deranged or characterless.

Conclusions and Importance: We conclude that the impact of cerebral palsy is spectral, panoramic and heterogeneously variable, unlike in developed settings, hip joint dislocations and subluxations related difficulties appear relatively inconsequential in this setting.

The concerns of the idiopathic cryptogenic subsets, raises the possibility of a genetic aetiology and suggests a re-examination of the need for an apposite genetic counseling.

These results could lead to a better comprehension of the likely putative antecedents and aetiopathogenic causal pathways in cerebral palsy, which might lead to specific and generic preventive interventions in this and other similar settings.

Introduction

Over the last four decades, cerebral palsy has remained the commonest physical disability in childhood, occurring in 2.0 - 2.5 per 1000 live births.

Its antecedents affect the developing brain during the prenatal, perinatal and post natal periods. Putative risk factors in the genesis of cerebral palsy include:

- genetic factors, perturbations in the modulation of cytokines and tumour necrosis factors,
- inherited coagulopathies, inflammations, prematurities, multiple gestations, hyperbilirubinaemia, intrauterine infections, birth asphyxia, overall
- compromise in the quality of intrapartum care, an interplay of these causations and
- several other more complex idiopathic cryptogenic mechanisms.

The plausible causal pathways and the risk factors associated with cerebral palsy were reviewed elsewhere. [1, 2, 3, 4, 5, 6]

The prevalence of CP has remained relatively constant; however the prematurity related forms are still on the increase with the improved survival of the very low birth weight infants. [7]

The molecular pathophysiology, epidemiology and plausible research directions for a more appropriate intervention in cerebral palsy have been proposed previously. [8]

Although the acute neurological syndrome on neonatal asphyxia is often overshadowed by prominent cerebral signs such as coma and seizures, the motor defects may be partly attributed to concurrent spinal injury. [9]

In most developed settings, comparisons of ongoing epidemiologic studies against previous investigations resuggests the dynamism in the epidemiology of cerebral palsy. [10, 11, 12, 13]

However the case is quite different in most developing settings where these aspects have never been previously determined, or revisited, therefore most policy makers may lack exact initial figures to direct their decisions.

To close this gap this review was proposed.

Patients and Methods

This is a prospective observational descriptive hospital based study of cases of cerebral palsy presenting to the child neurology clinic of the Royal Victoria Teaching Hospital, Banjul, Gambia, West Africa August 2005 to September 2009, undertaken using a uniform case report form, for information concerning genetic, pregnancy, developmental and delivery related risk factors, followed by a standardized historical, clinical, laboratory, radiological evaluation and data acquisition.

If these aspects were indistinct or equivocal, serial evaluations were undertaken to achieve the diagnosis of cerebral palsy with some degree of certainty.

Final case status was achieved by an extensive evaluation and case record review undertaken in a standardized manner using a most stringent inclusion criterion.

Patients were excluded if the diagnosis of cerebral palsy was not definite or the diagnosis was subsequently changed, the data is inadequate or if a progressive rather than a static encephalopathy is suggested as was previously proposed. [14, 15]

A birth weight less than 2500g was considered low. Encephalopathy of prematurity refers to brain injury related to prematurity and includes conditions such as intra-ventricular haemorrhage and periventricular leucomalacia. Birth asphyxia was considered compatible if there was a history of inability to cry after birth, early neonatal encephalopathy, seizures or cardiopulmonary instability warranting resuscitation and subsequent neonatal admissions. The timing of the antecedents to the cerebral palsy were categorized as prenatal, perinatal, postnatal (acquired) and uncertain. Prenatal refers to the period before the onset of labour, perinatal to the period shortly before birth, or after birth and acquired (post neonatal) to insults occurring from 28 days to 5 years of age. Pursuant of the established classification scheme, the diagnosis of a hemiplegic cerebral palsy was made when one side of the body was affected, and a diplegic cerebral palsy, when the lower half of the body was more affected than the upper half, and in triplegic cerebral palsy three limbs are affected and in tetraplegic or quadriplegic cerebral palsy, the whole body is affected. Tetraplegic and quadriplegic cerebral palsies could be symmetrical or asymmetrical based on whether the two sides of the body are affected equally or not. Other inconsistencies associated with spastic cerebral palsy such as abnormal muscle tone, increased reflexes with a tendency towards clonus, positive Babinski's sign, contractures, restrictions in the pronation or supination of the forearms, decreased range in abduction of the hips, scissoring of the lower extremities, toe walking, and dynamic equinus were searched for. The other relevant differentials were excluded.

The chorea-athetoid form of cerebral palsy was suggested when there is generally writhing movement of the hands, feet, arms, muscles of the face or tongue. In hemiplegic cerebral palsy, an abnormally early hand dominance in infancy, associated with weakness on one side of the body suggested the diagnosis. The atonic diplegic form of cerebral palsy was inferred by the presence of lower limb atony especially when a history of birth asphyxia could be elicited

retrospectively, which is usually caused by the associated diaphragmatic and respiratory muscles weakness.

Ataxic cerebral palsy is diagnosed if there is associated poor co-ordination, unsteady gait, and difficulty with rapid or precise movements.

The cerebral palsy was determined to be mixed in type in the presence of spasticity, dystonia and athetoid movements. All the cases underwent a repeat thorough neurological examination as well as developmental assessments including an in-depth history to ascertain the co-existence of associated epileptogenesis, cognitive, language, or motor skills difficulties on presentation and other associated difficulties.

Repeat periodic follow up assessments were performed by the responsible attending paediatrician,

Results

341 cases met the inclusion criteria. Of these 339 (99.41%) were of African ancestry and 2 (0.59%) cases were of Mediterranean ancestry. The historical data was acquired from the mother, father, parents, maternal auntie, paternal auntie, paternal uncle, maternal uncle, maternal grandmother, elder cousins and contemporaneously from other sources in 127 (37.24%), 15 (4.40%), 57 (16.17%), 51 (14.96%), 15 (4.40%), 15 (4.40%), 16 (4.69%), 14 (4.11%), 19 (5.71%), 12 (3.52 %) of the cases respectively. Male gender constituted 207 (39.30%) and female gender 134 (60.70%) of the cases respectively.

The maternal and paternal ages at the time of conception were considered advanced in 137 (40%) of the cases and the maternal age in 82 (25%) of the cases, the maternal age was considered low in 15 % (4.40) of the cases and the paternal age in 5 % (1.47%) of the cases. 39 (11.44%) of the cases were of ages less than six months on presentation, 89 (26.10%) of the cases presented between the ages of more than six months to one year, 149 (43.70%) presented between the ages of more than one year to six years, 51 (14.96%) at presentation were aged above six years to 12 years and, 13 (3.81%) presented at more than 12 years.

In 111 (32.55%) of the cases, the parents had marriage structures consistent with variable degrees of endogamy or consanguinity with the strengths of endogamy ranging from 55 (49.55%) first degree relatives, 33 (29.73%) second degree relatives, 23 (22.72%) with third degree relatives.

The first child was implicated in 123 (87.24%) of the cases, the second child in 67 (19.65%) cases, the third child in 64 (18.77%) cases, the fourth child in 36 (10.56%) cases, the fifth child in 17 (4.99%) cases, the sixth child in 15 (4.40%) cases, the seventh child in 7 cases (2.05%), the eighth child in 5 cases (1.47%), the ninth child in 13 cases (3.81%), the tenth child in 4 cases (1.17%).

In 269 (78.89%) of the presentations were overt, whereas in 72 (21.11%) it was covert.

In 185 (54.25%) of the cases, associated epileptogenic events such as recalls of Neonatal seizures in 70 (20.53%), Infantile spasms in 31 (9.09%), semiologically variable remote symptomatic seizures in139 (40.7%) and other unclassifiable paroxysmal events or convulsive equivalents in 10 (2.93%)

Severe failure to thrive in 54 (15.84%), variable degrees of speech defects in 265 (77.71%), variable degrees of impaired auditory function in 134 (39.30%)defective nuchal regulation at 36 (10.56%) and strabismus at 22 (6.45%),

Urinary Incontinence in 63 (18.5%), respiratory difficulties in 116 (34%)

In 5 (1.45%) a family member of the child has a cerebral palsy; in 3 cases there was death of a sibling with cerebral palsy.

Associated congenital malformations and dysmorphic features noted were Microcephaly at 109 (31.96 %) cases was the most predominantly featured, macrocephaly at 7 (2.05%), unduly wide anterior fontanels 6 (1.76%), unusual non- specific unclassifiable dysmorphic features 4 (1.17%), flat nasal bridge 3 (0.88%), epicanthi inversus 2 (0.59%), bilateral developmental cataracts 2(0.59%), microstomia 2 (0.59%), rhizomelic short limbed dwarfism 2 (0.59%), low set ears, cranio-synostosis, orbital hypertelorism, unduly long and prominent philtrum, arthrogryposis of the ankle joints, frontal bossing, synophyrys and medial eyebrow flares, right renal agenesis, right and left nephromegaly, congenital indistinct abdominal tumefactions were the other features noted in other cases respectively.

Transfontanelle ultrasound was applied in 123 cases where a patent anterior fontanel made this achievable. 78.86% revealed normal features. Significantly abnormal features noted were dilated lateral ventricles, dilated third ventricles, hydrocephalus, brain atrophy, periventricular echodensities, calcifications and echolucencies in 13(10.57%), 6 (4.88%), 6 (4.88%), 4 (3.25%), 5 (4.07%), 3 (2.44%), 1 (0.81%) cases respectively.

Ventricular septal defects, patent ductus arteriosus, Tetralogy of Fallot, Mitral valve prolapse, dilated right ventricles, non-specifically significant congenital structural cardiac defects in 5 (1.47%), 2 (0.49%), 2 (0.49%), 2 (0.49%), 2 (0.49%), 2 (0.49%), 2 (0.49%) respectively were the predominantly featured irregularities noted in this series.

Moderately Severe anaemia, leucoytosis with a left shift, thrombocytosis, high ESR, variable morphological inconsistencies were the prinicipally associated haematological irregularities noted in 30 (8.80%), 17 (4.96%), 8 (2.35%), 25 (7.33%), 20 (5.87%) respectively. There were no cases with abnormal INR or prothrombin time.

Table 1: The commonly associated putative factors and antecedents of cerebral injury causing cerebral palsy in this series were:

Prenatal antecedents:

Maternal Factors	Frequency	Percentage
Dystocia with prolonged labour	22	6.45%
Compatible intrauterine infections	15	4.40%
Cesarean section	12	3.52%
Antepartum haemorrhage	7	2.05%
Pre-eclampsia	6	1.76%
Unassisted home delivery with risk of sepsis and trauma	6	1.76%
Severe hyperemesis gravidarum	4	1.17%
Premature placental abruption	4	1.17%
Eclampsia	3	0.88%
Cardiac insufficiency	3	0.88%
Severe anaemia in pregnancy	3	0.88%
Maternal gestational diabetes mellitus	2	0.59%
Chorioamnionitis	2	0.59%
Severe anaemia in pregnancy	3	0.88%
Severe malaria	2	0.59%
Maternal demise	2	0.59%
Maternal history of multiple adverse events	3	0.88%
Puerperal psychosis	2	0.59%
Precipitated labour	2	0.59%
Postdates	2	0.59%
Compatible coagulopathy	2	0.59%
Breech presentation	2	0.59%

Table 2: Perinatal Factors antecedents:

Fetal Causes:	Frequency	Percentage
Cord prolapse + entanglement	2	0.59%
Meconium stained liquor with compatible fetal distress	7	2.05%
Arteriovenous malformations	2	0.59%
Compatible vitamin K dependent bleeding	2	0.59%
Neonatal seizures	3	0.88%
Neonatal septicaemias	55	16.13%
Prematurity + Low birth weight	20	5.87%
Neonatal respiratory distress syndrome	5	1.47%
Uneventful twinning	4	1.17%
Early twin death	3	0.88%
Severe perinatal asphyxias	78	22.87%
Infantile trauma	8	2.35%
Bilirubin encephalopathy with a greenish tinge to primary dentition	6	1.76%

Table 3

Post neonatal antecedents:	Frequency	Percentage
Ex-Meningoencephalitis	67	19.65%
Trauma	6	1.76%
Near Drowning	1	0.29%
Toxic Ingestion	1	0.29%
Ex-Cerebral Malaria	10	2.93%
Ex-Multiple metachronous infective aetiology	2	0.59%

In some instances, there is more than one antecedent or risk factor associated with a case.

Table 4

Types of Cerebral Palsy:	Frequency	Percentage
Symmetrical Spastic Tetraplegia	228	66.86%
Spastic Diplegia	14	4.11%
Choreo-athetoid dyskinetic	3	0.88%
Non-familial ataxic cerebral palsy	8	2.35%
Atonic Diplegia	18	5.28%
Mixed	3	0.88%
Left spastic hemiplegia	16	4.69%
Right spastic hemiplegia	19	5.57%
Familial genetic cerebral palsy compatible with cerebellar non-progressive ataxic CP in 3 siblings	3	0.88%
Asymmetric spastic tetraplegia with affectation of the R>L	3	0.88%
Acquired right spastic hemiplegia	4	0.88%
Acquired left spastic hemiplegia	3	0.88%
Asymmetric spastic tetraplegia with affectation of the L>R	3	0.88%
Atonic hemiplegia	12	3.52%
Atonic tetraplegia	3	0.88%
Spastic Triplegia	2	0.59%

Table 5: The Incidence of seizures, non-classifiable paroxysmal events and convulsive equivalents in the various types of cerebral palsy

CP Type	Frequency	Percentage
Spastic Hemiplegia	28	67.5%
Spastic Diplegia	7	54.6%
Spastic Tetraplegic dystonica	143	62.7%
Atonic Diplegia	4	23.5%
Ataxic cerebral palsy	1	33.3%
Genetic familial ataxic cerebral palsy	1	33.3%
Dyskinetic-Choreo-athethoid cerebral palsy	1	33.3%

Discussion

Historically, several aspects of the aetiopathogenic mechanisms in cerebral palsy originally known as Littles disease until the nomenclature cerebral palsy was synthesized by Williams Osler, were contentiously discussed by several investigators. [16, 17]

In 111 (32.55%) of the cases in this series variable degrees of consanguinity and endogamy was suggested historically. This factor was considered a significant association by another study elsewhere where a figure of 51.7% was proposed for endogamy and

Table 6: Cranio-Facial Computer assisted tomographic features in Spastic Tetraplegic

CT Features	Frequency	Percentage
Pan-ventriculomegaly	14	4.95%
Schizencephaly	4	1.14%
Global cerebral atrophy	10	3.53%
Significantly increased sub-arachnoid spaces	20	7.07%
Poroencephaly	4	1.41%
Cerebral infarctions	6	2.12%
Severe bilateral lateral ventriculomegaly	115	40.64%
Moderately severe dilated third ventricle	15	5.30%
Stenosis of the Sylvian aqueduct	2	0.71%
Multiple calcifications	4	1.41%
Amply cisterna magna Normal features	18	6.36%
Normal features	71	25.08%

Table 7: Predominantly featured CT features in congenital hemiplegia

CT features	Frequency	Percentage
Cystic poroencephaly	7	14.89%
Arachnoid cysts with possible agenesis of the corpus callosum	4	8.51%
Cerebral infarctions	20	42.55%
Haematomas	2	4.26%
Cortical/subcortical cerebral atrophy	6	12.77%
Normal features	8	17.02%

Predominantly associated cranio-facial computer assisted tomographic scan in acquired hemiplegia.

Table 8:

CT features	Frequency	Percentage
Poroencephalic cysts	2	28.57%
Left Cerebral Infarctions	3	42.86%
Left paraventricular calcifications	1	12.5%
Left Cerebral atrophy + Left lateral ventriculomegaly	1	12.5%
Right cerebral atrophy + Asymmetry of the posterior horns of the right lateral ventricles + Asymmetric right cerebral hemisphere	1	12.5%

Table 9: Commonly associated CT features in non-progressive ataxic cerebral palsy

CT features	Frequency	Percentage
Absence of the corpus callosum	2	7.41%
Severe fourth ventriculomegaly	1	3.70%
Global cerebral atrophy	8	29.63%
Dandy Walker syndrome	2	7.41%
Arachnoid cyst with agenesis of the corpus callosum	1	3.70%
Right cerebellar tumour	3	11.11%
Decreased subarachnoid space	8	29.63%
Normal	2	7.41%

Table 10: CT features in Atonic Diplegia

CT features	Frequency	Percentage
Cortical dysplasia	3	3.57%
Pachygyrias	3	3.57%
Schizencephaly	3	3.57%
Lissenencephaly	2	2.38%
Alobar poroencephaly	5	5.95%
Increased subarachnoid spaces	15	17.86%
Dilated third ventricle	3	3.57%
Big arachnoid cyst	2	2.38%
Big poroencephaly	2	2.38%
Decreased subarachnoid spaces due to cerebral oedema	2	2.38%
Fourth ventricular compression	1	1.19%
Cerebellar vermix tumour	4	4.76%
Cerebral atrophy	15	17.86%
Lateral ventriculomegaly	15	17.86%
Medulloblastoma	2	2.38%
Glioblastoma	2	2.38%
Normal	5	5.95%

Table 11: CT Features in Spastic Diplegia:

CT features	Frequency	Percentage
Increased subarachnoid spaces +Amply cisterna magna	5	15.15%
Atrophic Lateral ventriculomegaly	0	27.27%
Encephalomalacia	6	18.18%
Cortical/subcortical atrophy	8	24.24%
Normal	5	15.50%

consanguinity and a disproportionate increase in the cases of cerebral palsy noted. [18]

In this series 109 (31.96%) of the cases were associated with prenatal antecedents, 195 (57.18%) of the cases were due to perinatal antecedents and 87 (25.51%) of the cases were due to postnatal antecedents.

The reports of the putative causal pathways for cerebral palsy from various settings are heterogeneously interesting, whereas severe perinatal asphyxia as the commonest cause of cerebral palsy at 78(22.87%) in our series agreed with the results demonstrated by other investigators in other epidemiologically similar settings [19, 20, 21].

It differed from that in another closely related epidemiological setting, elsewhere in West Africa where kernicterus was proposed as the major putative factor implicated in its aetiopathogenesis [22] and another in East Africa where the postnatally acquired infective factors following catastrophic febrile illnesses were postulated to be the most likely putative mechanism.[23] These postnatal factors continue to be considered significantly important in Asia and South Africa [24, 25]

In this series 67 (19.65%) of the cases were related to meningoencephalitis and 10 (2.93%) of the cases to cerebral malaria respectively, whereas trauma contributed to 6 (1.76%), toxic ingestions and accidental poisoning and near drowning were identified as the aetiological factors in each case respectively. Acute metachronous infective causes were suggested in two cases. Near drowning as the compatible aetiopathogenic factor implicated in a case of cerebral palsy has been reported previously in this setting. [26]

Trauma as a cause could be important medico-legally because of its implications for non-accidental injuries. In this series there are cases of CP associated with multiple pregnancies represented by 4 cases of uneventful twinning, 3 cases with early twin death, and 2 cases of triplets. The influence of multiple pregnancies on cerebral palsy was thought not to be related as such to the higher incidence of prematurity or low birth weight in this group but probably due to other idiopathic idiosyncratic genetic disturbances, especially in cases associated with, recognized, unrecognized or unregistered death of same sex co-twin which exposes the surviving twins to cerebral injuries.[27, 28, 29]

Furthermore, in monozygosity its aetiopathogenesis gets even more complex and less understood, especially with the negative impact of the putative placental vascular anastomosis on feto-fetal transfusions, haemodynamic instability and thrombotic-embolic events, which leads to the development of cerebral abnormalities in utero. Ongoing studies on Doppler and continuous monitoring of funicular circulation will likely lead to a better elucidation of plausible aetiopathogenic mechanisms and direct appropriate investigations and interventions for this group. [30, 31, 32, 33]

There appears to be some exponential increase in the incidence of cerebral palsy with increasing plurality.[34] Further investigations comparing the incidence of cerebral palsy in singletons and twins yielded more interesting results after allowing for gestational age and birth weights. Spastic bilateral cerebral palsy appears to be more frequent in twins compared to singletons.[35] Even with all these putative causal pathways taken into consideration, the future might not be quite close, because Idiopathic-cryptogenic factors continue to be considered significantly important by several investigators contributing to as much as 50% of the cases in some series, lending support for further investigations of this aspect. [36]

Although anecdotally, birth related trauma and asphyxia were thought to be significant directly attributive risk factors in cerebral palsy, this conception has been recently called into question, because in most children with cerebral palsy there is no amnesis to such traumatic events [37]

Recent and ongoing investigations proposed prenatal perturbations associated with coagulopathies and exposure to intrauterine infections and inflammations as putative factors in neonatal encephalopathies preceding emergence of cerebral palsies. [38]

In this study maternal intrauterine infections, home delivery with real risk of sepsis and trauma,chorioamnionitis and neonatal septicaemias which are factors commonly associated with infective and inflammatory processes were noted in 15 (4.40%), 2 (0.59%), 55 (16.13%), 6 (1.76%) of the cases respectively.

In this series, 5 (1.45%) of the cases of CP have at least a family member with a history of cerebral palsy; a case of familial genetic cerebral palsy of the non-progressive cerebellar ataxic form was noted in three siblings and in three other instances siblings with cerebral palsies eventually died. The genetic basis of some forms of cerebral palsy has been previously proposed and its trend in the spastic tetraplegic dystonic forms of cerebral palsies analysed. [39]

The strong association between cerebral palsy and lower socio-economic factors partly independent of the established social gradients in birth weight and gestational age was previously demonstrated. [40]

None of the mothers in this series gave a history of cigarette smoking. Given the occasional astonishing overlap between cerebral palsy and neurodegenerative disorders, a putative algorithm for distinguishing progressive degenerative neurodevelopmental disorders from stable cerebral palsy have been proposed [15]

Most cases presenting to the Child Neurology clinic were usually referred cases and a few were cases followed up after an ICU and NICU interventions.

The peak age at presentation of these cases which were within the first 2 years of life in this series, compares with the age of presentation in other series from a similar epidemiological setting.[41] On average most children with cerebral palsy will present before the age of two as was suggested by this and other series.

The higher incidence of cerebral palsy seen in male children in our series at 60.70% concurs with that reported by a study from other epidemiologically similar settings [19, 41]. However this figure differed from that advanced by another study accomplished elsewhere, where the gender difference was thought to be inconsequential. [34] Cerebral palsy accounts for about 37% of the referrals and cases presenting to the child neurology clinic, which is unlike the figures proffered previously by other investigators in otherwise similar epidemiological settings in West Africa where it comprised about 16.2% of the new referrals to their childs neurology clinics. [42, 43]

In this series, the first child of the family was involved most and there was a progressive decline in the incidence of cerebral palsy down the birth order, which partly concurs with the data proffered by other investigators in epidemiologically similar settings where the incidence was found to be higher among the first borns and the fifth borns respectively with a decline in between. [19]

Some form of motor impairment is present in all cerebral palsy cases, of this 72 to 91% of those with CP have a spastic syndrome, which may either be a hemiplegia (21-40%), diplegia (13-25%) or tetraplegia (20-43%). [44]

This is in consonance with the figure from this series where all the cases had some form of motor impairment. The commonest type of cerebral palsy in this series being the symmetrical bilateral spastic tetraplegia at 66.86% is close to a figure of 61% proposed by other investigations from an epidemiologically similar setting in Asia, [24] but it is significantly more than that seen in other series in developing and developed settings where although spastic tetraplegia was also the most common form of cerebral palsy encountered, it was much less frequently so [45], and from elsewhere, in the Middle East where an incidence of 36% was proffered [46].

In other series, although the spastic tetraplegic form of cerebral palsy was reported commonly at 38%, the hemiplegic form was the most common form of cerebral palsy encountered at about 40%. [10, 47]

The reason for isolated right hemiplegic cerebral palsy being encountered twice as commonly as isolated left hemiplegic cerebral palsy as was suggested by this and other series is idiopathic. [48] Although by definition, cerebral palsy refers to a motor dysfunction, there are many associated non-motor disabilities which often prove to be major handicaps. [49]

Given this position, the overt presentation of cerebral palsy is with a gross motor delay and complaint of a child not attaining his chronological appropriate motor milestones, suggested by an abnormal neurological examination. However, in some other cases the presentation could be more covert or unusual, such as with a strabismus, poor nuchal regulations, intractable seizures, failure to thrive, impaired executive and cognitive functions. In these cases the diagnosis could be suggested on further enquiry into the preconception health status of the parents, the presence of endogamy, adverse events related to the pregnancy and labour, a clear or vague history of neurodevelopmental delay could be elucidated on further inquiry or in the course of neurological evaluations or investigations.

In this series 269 (78.89%) of the cases presented overtly, and 72 (21.11%) presented covertly.

Presentations with defective nuchal regulation at 36 (10.56%) and strabismus at 22 (6.45%), accounted for the most common covert presentations of cerebral palsy in this series. The profile of the commonly associated difficulties in cerebral palsy have been reviewed elsewhere [24]. Singhi et al proposed a figure of 61% for its incidence in spastic tetraplegia associated with infective antecedents. Overall, associated difficulties were detected in75% of that series which is comparable to a figure of 66.86% determined in this series for other associated difficulties in cerebral palsy.

The relevance of searching for these commonly associated defects was reiterated by other investigators elsewhere.[50, 51]

The diagnosis of epilepsy in children with cerebral palsy is notoriously difficult, because of the commonly associated perturbations in the electroencephalogram and the predominantly featured unusual patterns which confound the diagnosis of frank convulsive seizures. Epilepsy in cerebral palsy tends to be persistent and intractable, especially when there is associated cognitive dysfunction. [52]

In this series, 54.25% of the cases have had events suggestive of unprovoked remote symptomatic convulsive events, cerebral dysarrthmias; unclassified paroxysmal events or convulsive equivalents, a figure of about 33.5% was suggested by Singhi et al [52] and a figure of 62% for the preponderance of epileptogenic events was proposed by Bruck et al [53]. The overall incidence of epilepsy in the subsets of cerebral palsy is heterogeneously interesting. It was most common in atonic-diplegia in a series [54] whereas its incidence in this series is more in the spastic hemiplegics which appears to concur with those of Singhi et al and Bruck et al. A figure of 60.95% was proposed for the onset of seizures before one year by a prospective study in Asia. [52]

Historical recall of witnessed events suggested neonatal seizures in 70 (20.05%) of our cases and in 31 (9.09%) instances, infantile spasms were inferred. Historical clues suggestive of neonatal and infantile onset of seizures portend a subsequent likelihood of developing remote symptomatic seizures in cerebral palsy [55] and especially the constellation of mental retardation, epilepsy and cerebral palsy, which is moreso if it is associated with an epileptic first degree relative. [56]

The latter association is independent of maternal age at the child's birth, his birth weight or gestational age. These factors were considered significantly important by previous investigations irrespective of associated cerebral malformations. [57]

The motor impairments in cerebral palsy, especially the spastic types, may lead to other impairments of the musculoskeletal system.

For instance among the hemiplegics, in adolescence about 75% could have hip subluxations, 73% contractures and 72% scoliosis. [44] Hip dislocation in cerebral palsy is one aspect that merits the specific indications for the institution of a surveillance program.

A hip joint surveillance programme with historical, clinical and radiological evaluations, co-ordinated in our paediatric neurology unit at presentation and at six monthly intervals thereafter, revealed displacement of the hip joint in children with cerebral palsy in this setting as not a matter of significant concern. This could be due to the traditional practice of mothers carrying their children on their backs most of the time, especially the neurodevelopmentally compromised ones with ambulatory difficulties.

The beneficial effect of this practice may be analogous to that proposed for horse riding in treating muscle asymmetry in the trunk and the hip in CP. [58, 59]

However, the incidence of hip dislocation in cerebral palsy was considered quite significant by other investigators elsewhere [60, 61]

The early detection of CP related dislocation and subluxation of the hip joint in cerebral palsy will have positive implications for timely surgical interventions at an appropriate stage with the principal benefits of an early prevention of destructive degeneration lesions and functional impairments, less reconstructive surgeries and preclusion of salvage surgery. [62]

A figure of 18.5% was computed for urinary incontinence from our series which is similar to that of 23.5% proposed by other investigators elsewhere. In that series it was associated commonly to the severely affected mentally retarded tetraplegics with delayed bladder control compared to the spastic hemiplegics and diplegics. [63]

A figure of 25% was proffered for primary urinary incontinence in children and adolescents with cerebral palsy by another series, where equally tetraplegia and low intellectual capacities were its most significant antecedents. [44]

In one series a figure of 72.5% was proffered for the contribution of variable degrees of mental retardation to the other associated difficulties in cerebral palsy. [24]

Although children with mental retardation are classified as having a cerebral palsy, because they are neurodevelopmentally delayed, it is always good to make a distinction between these two because their specific interventions differ. Some children in our series with learning difficulties are placed in respite homes and they attend the school for children with learning difficulties. The differential assessment of motor and cognitive difficulties in cerebral palsy could be particularly difficult for the unwary, because a mentally retarded child having receptive deficiencies will not be able to execute expressive functions or command, conversely, in expressive or motor deficiencies the child will be unable to implement received and comprehended information.

Time experience and indirect retrieval of information will be implied for the elicitation of the relevant information. Other previous investigations proffered a figure of 23 to 44% for other difficulties in cerebral palsy such as cognitive difficulties, mental retardation and behavioural problems such as hyperactivity. The prevalence of cognitive impairments vary with the type of cerebral palsy and especially increase when epilepsy is present.[44] In this series epileptic events and cognitive impairments were invariably linked.

On the average, ophthalmic abnormalities are present in 62% of children with cerebral palsy. 71% of children with cerebral palsy are reported to have a low visual acuity. However, given that basic routine ophthalmological evaluations could not explain the low visual acuity in most cases, there is a high probability that perturbations in cerebral visual integrity could be implicated in its pathogenesis. [44]

A range of visual impairments proposed for children with cerebral palsy especially those delivered prematurely, include myopia, strabismus, glaucoma and ambylopia.

These lesions could progress to variable degrees of more permanent visual loss.

Visual difficulties in CP merit the criteria for a routine surveillance program.

Serial ophthalmologic assessments are recommended routinely for any child with global developmental delay, particularly if visual difficulties are suspected clinically.

Early identification and management of visual dysfunction by an ophthalmologist will circumvent irreversible visual impairment and improve and sustain a good postural control.[64]

A figure of 20% to 50% for visual impairments and 13 to 25% for refractive errors and strabismus was proposed by some investigations elsewhere. [65]

In this series, squint in 22 (6.45%), variable degrees of impaired visual function in 46, (13.49%), and bilateral cataracts in 7 (2.05%) were the principally associated visual difficulties.

Speech impairment is common at (42-81%) and is strongly associated with the type and severity of motor impairments, with the dyskinetic cases affected most (95%), followed by the tetraplegics (85%) and diplegics the least (20%). The most common impairment is dysarthria, but aphasia also occurs. [44]

In this series 265 (77.71%) cases had variable degrees of vocal difficulties.

Auditory evaluation is recommended routinely for any child with global developmental delay, particularly if language delay is present, and yield may reach up to 91% if hearing loss was suspected clinically. [65]

In this series auditory difficulties were detected in 134 (39.30%) cases.

Previous studies by several investigators in West Africa suggested the contribution of the several putative factors in the aetiopathogenesis of cerebral palsy related hearing impairments. [66, 67]

Issues pertaining to feeding, nutrition and growth are fairly common causes of concerns encountered in cerebral palsy. In this series, although up to one-half of the children could qualify for some degree of undernutrition, however only about 15.84% were noted to be severely malnourished. In another series a figure of 30% was proffered for undernutrition with subjects included in the study showing an overall compromised linear growth below the third percentile. [68]

A majority of CP children have gastrointestinal as well as feeding problems. Sucking and swallowing difficulties in the first 12 months of life are common at 57% and 38% respectively. Eighty percent have been fed non-orally on at least one occasion.

Significant silent aspiration is found in 68.2% of those with severe spastic cerebral palsy.

Linear growth in diplegia and hemiplegia are often significantly reduced.

More than half of the cases of children with cerebral palsy have

problems with their weight, either under or overweight. Almost a quarter of children with cerebral palsy have a stunted growth. Overall children with cerebral palsy are comparatively prone to varying degrees of respiratory difficulties, principally a consequence of neuromuscular dysfunction which could blunt cough reflexes and lead to aspiration and to chronic lung damage. These factors were considered very significant and common by several investigators elsewhere, [69] and continue to be considered very relevant and important in this setting. [70]

In this series an incidence of 34% was derived for compatible respiratory difficulties.

An increased incidence of anaerobic chest infections and pulmonary abscesses could be inferred from their increased tendency to aspiration. This will have implications for antimicrobial selection policy and invasive investigations. The predisposing features, the consequences, the crucial issues for the preclusion and corrections of these perturbations, the beneficial effects of physical therapy, exercise, good dental hygiene and surgical interventions have been proffered and discussed elsewhere. [69]

Issues pertaining to the manner in which the diagnosis of cerebral palsy was disclosed is also quite crucial [71] especially in those cases where the child is severely disabled and presented latter. [72] Most parents will wish to know if their child will be able to walk without support in future. On the average the answer to this question should be positive, given that children have an enhanced capacity to recover and improve following cerebral insults due to brain plasticity.[73] Our practice is to communicate the diagnosis and discuss the possible management options in as much a lucid and positive manner as will be achievable. In this series 3 (0.88%) deaths were related to cerebral palsy during the study period. These were confined to the most severely affected spastic tetraplegic cases, related to severe infective processes and malnutrition complicated by very severe anaemia in a case. This mortality figure is a far cry from that of 18% reported elsewhere in Asia. [74]

Many of the historical, classical or traditional treatment options for CP have been challenged, and several treatment options are now available using medical and surgical modalities. This will have implications for recognized complications of cerebral palsy such as spasticity and contactures; feeding difficulties; drooling; communication difficulties; osteopenias; osteoporosis; fractures; pain; and functional gastrointestinal abnormalities contributing to bowel obstruction, vomiting and constipation.

Although some aspects of the childs condition, such as motor functions could not be totally amenable to interventions, others such as seizures, impaired visual functions and squint could. The overall aim of the childs management programme will be to apply treatment options that will allow them to attain as much functional capacity as will be possible towards achieving independence. Although the roles of physical therapy and infantile stimulation were discussed controversially in the literature, there are anecdotal and ongoing evidence pointing to its overall beneficial effect. [75, 76, 77, 78, 79]

In our practice we found the application of physical therapy and infantile stimulation most useful in assisting the children to outgrow their cerebral palsies.

The application of muscle relaxants in cerebral palsy is relevant in the control of severe spasms in the worst cases, although several modalities of pharmacological options were proposed for spasticity in cerebral palsy [80, 81, 82]

In our practice we found the use of diazepam to have proved particularly useful especially with regards to the muscle stiffness and the flexor and extensor spasms that may induce pain, irritability and insomnia in spastic children. It is cost effective, safe, commonly available and easy to apply. In this series, besides an occasional report of hyperactivity and hyperkinesis, there were no other novel behavioural irregularities or defects of self regulations.

The effective management of epilepsy, hyperkinesis, spasticities, and insomnia in addition to counseling and education of their parents and their teachers enabled the parents and teachers to cope with these children, ameriolated rejections, and educational delays and improved psycho-social performance.

Major and minor congenital structural anomalies are significantly associated with cerebral palsy especially with increasing plurality, monozygosity and its associated placental anastomoses [31, 83, 84]

A profile of other congenital abnormalities that could be associated with a particular subset of cerebral palsy was compiled by an investigator, reiterating that putatively, most cases of cerebral palsy are likely prenatal in aetiology. [85]

A methodological search for covert or overt presentations of these congenital abnormalities will further have positive implications for the timing of the prenatal cerebral insults and aetiopathogenic classification. [86]

In our series, coincidental congenital abnormalities not commonly detected in children presenting ordinarily to our neurology clinic with other unclassifiable paroxysmal events or convulsive equivalents were over represented in this subset, which were in the profile of the series suggested by these investigators.

Furthermore recent investigations in cerebral palsy have revolutionized the direction in its intervention through MRS, chromatographic metabolic screens, novel chemical chaperone and enzyme replacement therapies in the genetic cerebral palsy.

It clarifies diagnostic enigmas caused by the astonishing overlap between cerebral palsy and other simulating conditions such as dopa responsive dystonia (Sagawa disease). This differentiation will have a positive management implication for the latter. [87]

Since features on neuroimaging are unlikely to change chronologically, given the static nature of cerebral palsy, therefore figures from investigations in older children could be used retrospectively to infer reliably the likely putative antecedents.

Neuroimaging in cerebral palsy has the principal benefit of assisting to elucidate the likely structural antecedents to the cerebral palsy such as developmental brain abnormality, sequelae of intrauterine infections or some other congenital structural abnormality. [88]

MRI/MRS offers a higher resolution for the detection of therapeutically, prognostically relevant abnormalities undetectable at CT with a higher accuracy 77%/89%.This figure for MRI is improved considerably by modifications such as spectroscopy and diffusion tension imaging. However, an excellent concordance at 0.849 using the Kappa coefficient has been suggested previously for CT and MRI, and CT being easier to apply in children, cost effective, readily available, detecting calcifications associated with intrauterine infections with certainty, could offer a reasonable option.

A figure of 61% was proffered for structural irregularities on cranial CT by an Asian Study [52] which is similar to a figure of 67.5% determined from our series, and in consonance with the experience of other authors. [65]

Neuroimaging in cerebral palsy is especially useful if it reveals an abnormality that is surgically modifiable or potentially operable such as ateriovenous malformations, hydrocephalus or vermian tumours. Ultrasound though cost effective, safe, and easily applicable, may not be very appropriate for offering an adequate resolution in imaging in cerebral palsy, moreover, it will not be appropriate for the older child with closed fontanel. It is also not a very valuable tool for follow up, because it cannot offer an appropriate follow up opportunity due to chronological diminutions in acoustic windows.

A strong association of an abnormal cranial ultrasound in most cases of hemiplegia compared to normal cranial ultrasound was previously proposed by investigators elsewhere. [44]

Compared to early infantile CT, transfontanel ultrasonic echography proved reliable in detecting extensive periventricular leukomalacia, cystic parenchymal haemmorrhagic and infarctive lesions, periventricular flares and echodensities which indicates a high probability of neuromotor sequelae at about 56% to 85%. [89]

An incidence of 4% was proposed for hemispheric atrophy in congenital hemiplegic cerebral palsy.[90] This is unlike the figure of 12.77% determined in our series.

These features continue to be considered important predictive cytoarchitectonics by further investigations [91]. However, ultrasound may not offer an adequate resolution for the more subtle minor changes[92]. In this series, of the 123 cases where cranial ultrasounds were acoustically achievable,78.86% were normal and informative investigative results were achieved in 26 instances. 6 (4.88%) had hydrocephalic ventriculomegaly, whereas 13 (10.57%) had atrophic ventriculomegaly, periventricular echodensities or echolucencies and calcifications were the other commonly associated lesions noted. In those cases where patent fontanels made cranial ultrasound acoustically achievable by providing a window, it is possible that on progression to a higher resolution imaging with MRI these normals will reveal features related to PVL complex. [93]

Imaging in cerebral palsy is invaluable for aetiopathogenic classification and prognostication. In this series the predominantly featured cerebral atrophy in the various classes of Cerebral palsy is in keeping with the results proposed by previous investigations elsewhere.[94] CT in cerebral palsy by itemizing eloquent areas of neuro- pathological interests could suggest the approximate temporal time of the insult which could offer a clue to the possible aetiopathogenic mechanisms involved with their likely related risk factor.

Previous and recent reports on neuropathological findings related to cerebral palsy have singled out PVL complex associated to perinatal leukoencephalopathy as a very important putative factor in its aetiopathogenesis. Most cases with normal scans and poroencephalic cysts in this series could have features suggestive of PVL on progression to MRI as was suggested by previous investigations. [95]

It is plausible to infer that PVL due to periventricluar atrophy are acquired earlier, between the 28th and 35th week of gestation compared to cortical lesions.

This earlier acquisition and demonstration of PVL more than other neuropatho- radiological patterns may have implications for a unified causal pathway for the progression of neonatal seizures, infantile spasms and more severe intractable seizures unlike previous reviews that suggested multiple factors. [96]

Further indications for CT in cerebral palsy are in the evaluation of its cerebral cytoarchitectonics, especially in cerebral palsy with difficulties such as epileptogenesis.

A figure of 61% was proffered for structural irregularities in cranial CT by an Asian study.[52] Our imaging features concur with that proffered by investigators elsewhere who suggested a heterogeneous pattern of brain damage. In spastic diplegia

the periventricular white matter is mainly implicated, in spastic quadriplegia cortico-subcortical lesions and hypoplasias of the corpus callosum are common features.

Unilateral lesions predominate in the case of hemiplegia. Hemiplegic patients may also present with damage to the white matter cortico-subcortical lesions and congenital brain malformations. The CT in hemiplegic cerebral palsies could depict periventricular atrophy, and cerebral malformations in 16% of cases. In 25% to 30% of congenital hemiplegia the CT is normal. [97]

In 17.02% of the congenital hemiplegics cerebral palsies in our series the features were normal.

In this series 23.40% of the cases of congenital hemiplegias had congenital structuralabnormalities such as poroencephalic cysts and agenesis of the corpus callosum, which are figures not terribly distinct from those proposed previously.

A figure of 17% was proposed by Wiklund at al. [98, 99]

Previous independent studies failed to determine any abnormalities in the obstetrical history of a majority of infants with hemiplegia. [100]

In both the congenital and acquired cases of hemiplegia, hemiatrophy, infarctions and their sequelae were the most principally associated phenomena. [94]

If basic simplistic algorithmic classifier of CT features as was proposed by Wiklund et al for congenital hemiplegia is employed for determination of putative antecedents, in this series, then
CT1=Normal Features (17.02%) which could be evaluated further at MRI,
CT2=Unilateral or asymmetric ventriculomegaly (4.26%) which is associated with perinatal antecedents especially the prematurity related ones;
CT3=cortical/subcortical cavities (12.77%);
CT4=hemispheric atrophy and other findings (46.8%);
CT5=malformations with principally extra cerebral malformations and prenatal antecedents (4%), with antecedents in CT3 and CT4 more indistinct and ill-defined corresponding to the Idiopathic, cryptogenic antecedent subsets. This could direct future research and have implications for weighting the accurate timing for preventive interventions.

Our neuro-imaging figures are fairly similar to those proposed by previous investigators who suggested that:

In spastic Tetraplegia, diffuse cortical atrophy, hydrocephalus, multiple cystic lesions in the white matter and cavities communicating with the lateral ventricles were the commonly associated neuro-radio-pathological features. [101]

In atonic diplegia or hypotonic form of cerebral palsy, an enlarged ventricular system was the most frequent neuro-radio-pathological feature demonstrated. [102]

However, previous investigations proposed that there were no statistically significant differences between the frequencies of pathological CT findings in the groups with

Tetraplegia, diplegia and paraplegia. [103]

Some of the injury pattern observed seems to be related to the displayed clinical features. Dyskinetic cerebral palsy is characterized by the absence of distinctive lesions and alterations of the basal ganglia and thalamus. [99]

These are fairly similar to the predominantly associated features on neuroimaging in our series where variable degrees of cerebral atrophy associated with bilateral lateral atrophic ventriculomegaly were the predominantly featured phenomena in most subsets of cerebral palsy, in addition to hemispheric weighting in the hemiplegic subsets.

Very few studies have been conducted that take the different types of CP into account in comparing the findings on structural neuroimaging.The absence of recognizable areas of injury or abnormalities provide support for the notion that some cases of cerebral palsies are related to abnormalities of brain development at the microscopic level and diminishes the likelihood that the disease is caused by injury to a normally developed brain.

Accurate determination of the likely putative factor in cerebral palsy, and its associated defects have important implications for treatment, prognosis, and accurate interventions.

The specific determination of these putative factors will have immense significance with issues pertaining to evaluation of degree of expressivity in future kindreds, genetic counseling of families, implementation of preventive programs and occasionally for related medico-legal issues. Furthermore, accurate elucidation of causality will have implications for curtailing unnecessary investigations and unduly inappropriate interventions. Finally, characterizing and comprehending its exact aetiology will have implications for preventive and intervention strategies, and the knowledge from this will direct future research endeavors. Of all these interventions earlier interventions in potentially surgically modifiable conditions such as hydrocephalus, porencephaly, ateriovenous malformations, subdural haematomas and hygromas or a cerebellar vermian tumour will be the most exigent. This was considered quite important by one series, [104] but of less relevance by some other series, [105,106] and quite inconsequential by another series. [97,100,107] Abnormal CT scans will have implications for searching for other commonly associated overt or covert cognitive difficulties especially subtle symptomatic cerebral dysarrhythmias. [108]

Informative and normative neuroimaging features will have further implications for genetic and metabolic work up for unusual or atypical presentation of cerebral

palsy and its important differential diagnosis, especially in those cases associated with consanguinity, endogamy or familial aggregation. [109, 110, 111, 112, 113, 114, 115, 116, 117]

In this series, a familial aggregation of a compatible genetic form of non-progressive cerebellar ataxia in three siblings, an isolated case of non-progressive cerebellar ataxia, and 2 cases of spastic tetraplegia in Mediterranean consanguineously married parents with lactic acidosis were recommended for further metabolic and genetic evaluations.

However, given the retrospective nature of previous investigations, the exact incidence of this in cerebral palsy is still uncertain and is putatively thought to be negligible.

Ongoing prospective investigations will clarify these issues.

Unlike adults, children will more often than not have a coagulopathy, congenital cardiac defect or an inflammatory process as the antecedents to a hemiplegic cerebral palsy.

In this series, there were no obvious cases of coagulopathy as could be suggested by an abnormally deranged prothrombin time and International normalized ratio. However, thrombocytosis were demonstrated in 8 (2.35%) and potentially haemodynamically relevant structural cardiac defects were demonstrated in 14 (4.11%) of the cases in this series.

A measure of the impact of the disability on the lives of children permits greater precision in describing the epidemiology of cerebral palsy, especially in association with its recognized co-morbidities and mortalities, in adulthood morbidity and mortality from ischemic heart disease, cerebrovascular disease, cancer and trauma are higher in patients with cerebral palsy than in the general population. [118]

So most children with cerebral palsy will need to be followed up epidemiologically for these potential co-morbidities.

CP has an enormous diverse effect on the global neurological development of the child's executive and motor functions, achieving independence, and a good quality of life could be rendered most difficult.

Effective timely interventions following diagnosis could influence its clinical course favourably. 50% of the children with cerebral palsy use assistive devices of some sorts such as braces, walkers or wheelchairs. Evaluation of the child with cerebral palsy requires a multidisciplinary approach. This includes assessments for common associated pathology and functional difficulties and familial functioning.

This is an ongoing process and should be part of the care of a child with cerebral palsy.

Conclusions

These findings could contribute new knowledge to the global epidemiology of cerebral palsy from a developing settings perspective. The influence of the horse riding effect of carrying affected children on their mothers back on ameliorating hip dislocations were suggested. Appropriate targets based on the likely and significant antecedents were inferred to direct multimodal public health interventions.

Therapeutic interventions directed at preventing interruption of oxygen supply have not been shown to reduce the occurrence of CP. The over representation of minor and major congenital structural defects renders further support to the role of genetic, prenatal and idiopathic factors to the aetio-pathogenesis of cerebral palsy.

Future research directions and ongoing clinical trials suggests that mild hypothermia modifies cerebral metabolism in a healthy way and reduces death or disability in term infants following perinatal asphyxia. In conjunction with pharmacological strategies, this might be one of the steps in the right direction.

However, the situation could be different for most developing settings where estimates have suggested that a good part of cerebral palsy has no identifiable associated antecedents, which could partly be due to poor historical recall and documentation of adverse antenatal events.

Ongoing investigations aimed at achieving an exact aetiopathogenic causal pathway in cerebral palsy should be encouraged, given the shortcomings and inconsistencies of results from neuroprotective interventions offered to neonates against the putative asphyxial events, even if perfectly effective this will unlikely answer the questions in most cases of cerebral palsy, given the influence of non-asphyxial factors. [119,120]

Furthermore, this study catalogued the spectrum of birth defects associated with newborn encephalopathy and illustrates the importance of their inclusion when investigating for both the aetiology and outcome of this condition. Apposite care delivered by well trained personnel will be cost effective and provide sustainable preventive options. Adequate childhood immunization, nutrition and early interventions are further feasible preventive options.

In developing settings, given that intrapartum and post neonatal factors continue to be important in the pathogenesis of cerebral palsy, adequate attention should also be allocated to these areas. The post neonatally acquired cases could be the most preventable. [121]As these are preventable factors, earlier primordial, multifaceted public health interventions will have a more efficient cost benefit ratio compared to a later one. If the results from this review could lead to further comprehension of the underlying aetiopathogenic factors and thevariability in the epidemiology of cerebral palsy, then the derived information might lead to hypothesis generations, research directions

interventions preventing brain damage in pre-term infants, asphyxiated term newborns, other group of vulnerable infants and it also could characterize the idiopathic groups further.

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The Benefit of Amnioinfusion In Post Term Pregnancy In Preventing Of Meconium Aspiration Syndrome

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ABSTRACT

Objective: Our study was conducted to analyze the outcome and incidence of meconium aspiration syndrome in post term delivery and the benefit of intrauterine amnioinfusion.

Methods and materials: 32 pregnant women were followed antenatally in our hospital (Prince Hashim hospital in east of Jordan) through the whole length of pregnancy (10) months. Our patients were medically free and had no surgical or obstetrical problems apart from prolonged pregnancy. Medical records of diagnostic codes from the International Classification of Disease were used to identify neonates with severe meconium aspiration syndrome who had been delivered in our hospital. Clinical data of 25% (8) patients, including neonatal outcomes of cases of meconium aspiration syndrome associated with umbilical pH >7.20 at delivery who underwent amnioinfusion in post term delivery, were compared with data on outcomes of cases with pH <7.20, 75% (24) patients.

Results: Out of (8) patients who were managed by intrauterine amnioinfusion (6) patients 75% had normal umbilical pH>7.2 Good Apgar score at 1 minute and at 5 minutes (8l10 and normal acid-base balance and were immediately transferred to their mother while out of (24) 12.5% had meconium aspiration syndrome (3) patients (umbilical pH <7.2) and needed aggressive suctioning at delivery, as well as having a low Apgar score at 1 minute and at 5 minutes.

Conclusion: Intrauterine amnioinfusion has proved positive in preventing meconium aspiration syndrome by dilution of amniotic fluid contents and reduced blockage in the nasopharynx area

Keywords: Acid-base status, amnioinfusion, Meconium stained amniotic fluid, meconium aspiration syndrome, umbilical cord pH.

Introduction

Meconium is the first several stools passed by a newborn after birth. Occasionally, infants will pass some meconium into the amniotic fluid before birth as a sign of stress, but even in these infants, the majority of meconium remains in the intestine at the time of birth. Meconium stools have a characteristic dark green-black color and are very thick and sticky, quite different from either transitional or newborn stools, which are light yellow and usually fairly watery. Meconium consists of water, lipids, proteins, sterols, and cholesterol precursors derived from swallowed amniotic fluid, shed epithelial cells, and intestinal secretions. It begins to form in utero around the 13th week of gestation and accumulates thereafter. Meconium aspiration syndrome is the leading cause of respiratory failure in term infants affecting up to 5% of all infants born through meconium-stained amniotic fluid. (1)] Severe pulmonary dysfunction occurs in about one-half of the infants diagnosed with meconium aspiration (2, 3)syndrome. Meconium passage occurs in 10-20% of all deliveries and in as many as 40% of post-term pregnancies (2,3). Before 37 weeks' gestation, meconium passage occurs infrequently (5%) and may have a different etiology than term meconium such as intrauterine infection (2, 3). A strong association between meconium passage in preterm pregnancies and chorioamnionitis has been reported (3, 4, and 5). Also, in the presence of meconium, enhanced bacterial growth and inhibition of neutrophil bactericidal activities have been reported (5, 6). Previous studies have shown an association between meconium and maternal infection (6, 7). However, they (7) were either not initially designed to examine meconium and its association with

infection, or had small numbers limiting their ability to analyze other risk factors for infection. (8)

Based on term and preterm reports of infectious morbidity caused by meconium, prospective randomized trials of broad-spectrum antibiotic use in pregnancies complicated by meconium have been performed to reduce the risk of infection.(8) These studies have shown that broad spectrum antibiotics given throughout labor intravenously reduced the incidence of maternal infection but did not reduce neonatal infection. When antibiotics were given by amnioinfusion, it did not alter maternal or neonatal outcome significantly. (1)

Because the incidence of meconium passage increases with gestational age (and because preterm meconium may be associated with intramniotic infections), there may be an independent gestational age effect on meconium-associated infectious risk. In a large study investigating meconium as a risk for infection, an increase in gestational age in the meconium group was documented. (5, 6)

Therefore, in studying meconium effects on obstetric infections, one must account for gestational age and preterm-associated intra-amniotic infection risk (7, 8). To do this, we designed this study with sufficient power to analyze meconium and other risk factors for infection during labor and after delivery in term pregnancies.

Amnioinfusion

Infusion of crystalloid to replace pathologically diminished amniotic fluid has most often been used during labor to prevent umbilical cord compression. Results with intrapartum amnioinfusion to prevent fetal morbidity from meconium-stained fluid, often associated with oligohydramnios, are mixed. Pierce and colleagues (2000) performed meta-analysis of 13 studies with 1,924 such women randomized to amnioinfusion or no treatment. They found significantly decreased adverse outcomes: meconium beneath the cords (OR 0.18), meconium aspiration syndrome (OR 0.30), neonatal acidemia (OR 0.42), and cesarean delivery rate (0.74). Wenstrom and associates (1995) surveyed academic obstetrical departments and reported that amnioinfusion is widely performed with relatively few complications.

Materials and Methods: Through a prospective trial between (August 2000 - August 2001) our data was collected in the antenatal section in Prince Hashim bin al Hussein hospital which is a military hospital in the east of Jordan, in combined clinics of obstetrical and pediatrics. This was a no informed consent protocol. Our patients were medically free. Obstetric data were prospectively collected, although among infants admitted to the neonatal unit a consultant neonatologist (JM) collected neonatal outcomes from the hospital records after discharge. The use of the intrapartum passage or detection of meconium as screening tests for these adverse neonatal outcomes was then determined. 32 pregnant women were included in our trial; (8) pregnant women were managed by amnioinfusion. Gabbe and co-workers (1976) showed in monkeys that removal of amnionic fluid produced variable decelerations and that replenishment of fluid with saline relieved the decelerations. Miyazaki and Taylor (1983) infused saline through the intrauterine pressure catheter in laboring women who had either variable decelerations or prolonged decelerations attributed to cord entrapment. They found that such therapy improved the heart rate pattern in half of patients. Miyazaki and Nevarez (1985) subsequently randomized 96 pregnancies and found that nulliparous women in labor with cord compression patterns who were treated with amnioinfusion less often required cesarean delivery for fetal distress.

On the basis of these early reports, transvaginal amnioinfusion has been extended into three clinical areas:
- Treatment of variable or prolonged decelerations;
- Prophylactically in cases of known oligohydramnios, as with prolonged rupture of membranes;
- And an attempt to dilute or wash out thick meconium

Many different amnioinfusion protocols have been reported, but most include a 500 to 800 mL bolus of warmed normal saline followed by a continuous infusion of approximately 3 mL per hour (Owen and co-workers, 1990; Pressman and Blakemore, 1996). Wenstrom and co-authors (1995) surveyed use of amnioinfusion in American teaching hospitals. The procedure was used in 96 percent of the 186 centers surveyed, and it was estimated that 3 to 4 percent of all women delivered at these centers received such infusion.

Results: Of (32) patients (8) pregnant women were admitted to our department as a case of post-date (prolonged pregnancy) >42 weeks. Ultrasound proved dating as well as regular menstrual cycle (no O.C.P or I.U.C.D). There were also no differences in the rate of prenatal care, maternal medical complications, or maternal substance abuse between groups. After amnioinfusion was undergone, continous monitoring of the fetus was performed to show any fetal heart abnormalities. The immediate neonatal outcomes (1-minute Apgar score and umbilical artery pH), were significantly lower in the infants who passed meconium in utero. The FHR patterns differed significantly between groups. The fetuses with MAS had a higher baseline FHR, more decelerations, less accelerations and a lower FHR beat-to-beat variability. There was only one fetus in the MAS group in whom all FHR variables were normal. The Apgar scores at 1 and 5 min after delivery as well as the cord pH were lower in the sick infants (12%). (3) Patients who needed aggressive suctioning at delivery, had lower Apgar score at 5 minutes, compared to our well managed patients (8) 25% who showed good Apgar score at 1- minute as well as at 5 minutes and no need for aggressive management and suctioning. So the infant could be immediately transferred to the mother. Obviously the rate of

spontaneous deliveries was higher in healthy infants and significant difference was noted between groups with regard to maternal parity or gestational age. The possible association between fetal asphyxia and meconium aspiration has been evaluated in many studies. The impact of fetal acidosis on meconium aspiration has been proven in animal studies [11]. The data in the human studies are less consistent Thick meconium by itself is not associated with adverse fetal outcome. However, the incidence of meconium aspiration syndrome increases in cases of a non-reassuring FHR.

Conclusions

Amnioinfusion improves the outcome of prolonged pregnancy as well as decreases the incidence of Meconium aspiration syndrome in post-date pregnancy.

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